RATIONAL DICTIONARY
FRENCH ARCHITECTURE
From XI to XVI centuries

By

EUGENE EMANUEL VIOLLET-LE-DUC
Government Architect
Inspector General of Diocesan Edifices

Volume VIII

From Guai to Synagogue

PARIS

Translated by N. Clifford Ricker. D. Arch.
Emeritus Professor of Architecture
UNIVERSITY OF ILLINOIS

Urbana. Ill.

1919

QUAI. Quay. Bank wall.

A retaining wall built to maintain the banks of a river or harbor, to embank a stream of water, avoid freshets or washes.

Ancient harbors were furnished with fine quays, and in all Roman cities built on the banks of rivers, quays regulated their courses. Our mediaeval cities still frequently present traces of quays, well built of great stones.

The ancient Roman walls of the city of Paris long served as quays, and their traces are found at many points; but only v very late were erected quays on the right and left banks of the Seine, when the city had extended much to the north and south.

"Anciently," says P. du Breuil,[1] "along the small branch of the Seine that passes beneath bridge S. Michel and extends as far as the gate of Nesle,[2] there was no wall on the side of the Augustins; thus only a grove in the shade of which the inhabitants of Paris walked and refreshed themselves in summer. But in winter the overflow of the water came even into the houses of the said street. King Philip IV, called the Fair, commanded the provost and aldermen of Paris to build (or rather to extend the quay already begun) by great walls in all diligence before winter, by his letters patent given at the royal abbey of the blessed Mary near Pontisaram (which is Maubuisson) on June 9 th, 1312."

Note 1.p.1. Theatre des antiquites de Paris, edition of 1612, p. 772.

Note 2.p.1. Quay conti.

The walls of that quay still existed in part before the canalization of the small branch of the Seine. They were built of fine and regular courses of stone from the plain.

Under Francis I and Henry II were built at Paris quays along both banks of the Seine, from the valley of Misere to gate Neuve below the Louvre;[1] and from gate S. Bernard to below S. Victor.[2]

Note 1.p.2. Corrozet. Antiquities de Paris. p. 160.

Note 2.p.2. Du Breuil. p. 771.

The construction of these quays did not differ from that a adopted in our days; it consisted of a very thick wall of rubble externally faced with cut stones; sometimes if these retaining walls had much height, strength and bearing was given

to them by internal buttresses within the backing. Space being scarce in most mediaeval cities, men sought to extend over t the river by means of corbelling without narrowing the channel. But this mode of construction, an example of which is given (Fig. 1) had the inconvenience of presenting a series of obstacles to the stream in strong freshets, and it was rarely e employed unless the quay walls had a great height above low water. In certain cases, it was preferred to leave a vaulted canal under the quay, placing the external wall on isolated p piers connected by arches. Some portions of quays were thus constructed at Paris, notably along the north bank in the city. The city of Lyons possessed very beautiful parts of quays on the right bank of the Saone from the 15 th centurw, that had been built to protect that low bank along the shore of F Ferrieres from the inundations of the river. However these works lacked unity in the great cities of the middle ages: t they were portions leaving gaps, abandoned bluffs. There was necessary either the Roman power or our modern centralized administration with its means of expropriation, to be able to order and complete an entire system of quays along the banks of a river traversing a populous city. In fact, only in our days could be established lines of continuous quays in cities like Paris, Lyons, Bordeaux, Nantes, Rouen, etc., and our generation has still seen in most of our great cities, houses at many points washed by the stream.

QUATREFEUILLE. Quatrefoil.

In the language of archaeologists, this is the name given to an architectural member composed of four circular lobes. Fig. 1 gives at A a perfect quatrefoil, i.e., composed of four semicircles with diameters forming the four sides of a square. Quatrefoils are sometimes drawn so that the circles do not join, as seen at a. We also mention quatrefoil openings arranged as at B; in the sides of the towers of the cathedral of Paris, for example, and chiefly in structures of the beginning of t the 13 th century. Cinqfoil is likewise used to designate a member composed of five lobes (see C). During the 14 th century the cinquefoil is sometimes drawn according to Fig. D, i.e., with pointed arches; yet this form is rarely adopted. These g geometrical figures commonly (except B) fill the upper parts

of window tracery; it is one means for diminishing the area o to be glazed and for supporting the glass panels. Quatrefoils and cinqfoils also form ornaments on surfaces. And then are blind; the ends of the cusps are often ornamented by leaves. (Arts. Fenetre, Meneau, Redent).

RECLUSOIR. Cell for a Recluse.

It was customary to build near certain mediaeval churches little cells in which were immured women renouncing the world forever. These cells most commonly had a small grated opening into the interior of the church. P. de Breuil [1] relates that a certain Alix la Bourgette was thus shut within a little room near the great portal of the church of Innocents:- "And there is still seen a grating in a little window in the church by which she heard the mass." A bronze tomb was erected for that recluse in 1466 in the chapel Notre Dame. All recluses were not voluntary. "Renee de Vendomois having caused her husband to be slain," says Abbe Lebeuf in speaking of the cell of the holy Innocents,"the king in consideration of the duke of Orleans pardoned her in 1485; and the parlement with other punishments, condemned her to be perpetually a recluse, walled in at the cemetery of the Innocents, in a little house built for her. I have supposed," adds Lebeuf,"that the little isolated octagonal turret to be seen in the cemetery might be the prison assigned to her." But the little structure mentioned by Lebeuf was rather a lantern of the dead, such as it was customary to erect in nearly all cemeteries of the middle ages.

Note 1.p.4. Theatre des Antiq. de Paris. Edit. 1612.p.837. Hist. du dioc. de Paris. Abbe Lebeuf. Vol. 1. p. 80.

The same author relates that in the church S. Medard "was made a cell for a recluse in the 14 th and 15 th centuries, as in many others in Paris, i.e., a little cell in which lived a female recluse for the rest of her days."

There was never in any church more than one recluse at a time, those claiming to succeed her awaiting her death. That custom was very ancient, since in the abbey of S. Victor and before its rebuilding by Louis the Fat, there was a certain recluse Basilla,[2] who was buried in the cell in which she had spent her life.

Note 2.p.4. Hist. du diocese de Paris. Abbe Lebeuf.II.p.542.

There is stillseen in the mas-d'Azil (Ariege) a little cell near the choir and in the thickness of the wall, in which it was customary an insane person. That very small cell received air and light only from the interior of the church. There was indeed everything necessary to render insane a person in his senses; we do not know whether it was in the hope of curing these unfortunates, that they were shut up thus. Charles V caused to be built a beautiful oratory of wood at S. Merry, his parish, for a certain Guilliamette, who passed for a saint, who remained constantly in that place, where could be seen in ecstacy. The entire court had great faith in her sanctity, a and recommended themselves to her prayers.

REDENT. Cusp.

Thus is named the stone carvings in form of projections, th that decorate the interiors of the tracery of windows, the i intrados of arches or gables. (Arts. Fenetre, Meneas). Fig. 1 gives a cusp. These cusps sometimes terminate in a leaf ornament, as in the windows of the S. Chapelle of the palace at Paris.

The cusps are simple or compound. Fig. 1 presents a simple cusp; Fig. 2 has cusps of two sorts. The first at A is oldest and already appeared at the beginning of the 13 th century; the second at B is scarcely found till after 1240. In the first of these examples the double cusp is only composed of the same moulding. In the second are two mouldings, one for the principal cusp, the other for the secondary cusp. Some high windows of the transept of the cathedral of Amiens show in t the great foils of their tracery cusps composed like A. The architecture of Normandy of the end of the 13 th and 14 th c centuries often has cusps composed like that represented at B. It is easy to recognize that these portions of the stone sash are combined to diminish the dimensions of the glass panels. The cusps of the most ancient foils are inserted in the circular moulding. (See section a). Later they form a part of the stone tracery itself. (See section b). The little pointed arches that crown the vertical mullions of windows and date from 1230 frequently have cusps. (See sketch D, at d). In the windows of S. Chapelle of the palace at Paris are found the last cusps, perhaps for the first time, that result in giving resistance and vigor to the branches of the arches. (Art. Veneau).

Cusps are often placed as a simple decoration after the beginning of the 13 th century, either on the intrados of arches of porches or of doorways, or on the rakes of gables or gablets. Thus one sees very beautiful and large cusps that border the interior of the entrance archivolt of the tree outer arches of the portal of the cathedral of Amiens. These cusps terminate in bunches of leaves in good style and well composed, a specimen of which we give (Fig. 3). At A is traced the whole of this cut out of stone, maintained in the intrados of the archivolt, first by the joints f and by copper Ts in cast lead. At B is given the section of the cusps across the curved branch at a b and on the intervals at a c. These cusps date from about 1240.

Instead of being spanned by lintels, the central doorway of the portal of the cathedral of Bourges is terminated by two semicircular arches, richly sculptured and intersecting over the opening. Fig. 4 is one of the cusps belonging to a voussoir of the arch and reinforcing it. This decoration belongs to the constructions of the cathedral of Bourges built between 1240 and 1250.

The Articles Gable and Pignon exhibit the application of c cusps to copings that are detached either from the face of t the wall or against the sky. It is useful in this matter to observe how these details are generally well placed at the s scale of the architecture that they crown, and when they are intended to show against the sky, how they take bust the relative value which they should have. Among the cusps most happily proportioned, we shall city those which crown the gable of the north transept of the cathedral of Paris, cusps of which entire pieces were found beneath the roofs and were recently replaced. (Art. Sculpture).

REDUIT. Redoubt. Fort. Keep.

The last refuge of a fortress. The fortified cities of the middle ages had their fort, which was the castle; the castle had its fort, which was the keep. Even the keep sometimes had its fort, a last refuge allowing the obtaining of a capitulation, or to take the time to evacuate the place by subterranean passages or concealed posterns. The defense of places and of posts was so well divided during the middle ages, that it

might be prolonged at each post and each tower. At need this was to the death; thus a handful of determined men on occasion held in check an army corps. Hence we see powerful nobles at the head of numerous troops compelled to besiege for months a little garrison of a hundred men. One work was taken, and it was necessary to commence again. One part of the keep was lost and it was necessary to take the other. Men took the gate' t the adjacent tower, a refuge for that defense, still held out.

In the art of war and particularly in sieges, tenacity is certainly a superior quality. Feudalism was for us a school for acquiring that quality. We possessed it, and we have shown that we still possess it, at least in war. Let us then be more just in passing judgment on that old institution, against which is no need of so many invectives, since it is indeed dead, and we have received the best and purest of its heritage. Who will dare to say that in the veins of those petty soldiers a abandoned in a blockhouse or in some village, the pivot of a great manoeuvre , and who burned even their last cartridges without hopo of succor, that there was not a little of the traditional blood of the old feudal garrisons, defending foot by foot each tower and each story of a tower, striving to accumulate obstacles and delay the fall of a post, were this only for an hour! We have elsewhere described the general or special defenses of places and of castles; there is no need to r return to them here in regard to forts, which are only a relative part of those defenses, and our readers will refer to t the Articles Architecture Militaire, Chateau, Donjon, Siege and Tour.

REFECTOIRE. Refectory. Dining Hall.

A hall intended for the meals of the members of a community. Monastic houses possessed their refectories; the regular religious took their repasts in common in a spacious hall, well ventilated and opening on the cloister. (Art. Architecture Monastique). Usually one of the porticos of the cloister extended along the church, and the refectory adjoined the opposite portico.

One of the most ancient documents remaining to us on the r refectories of the religious houses of the middle ages is certainly the manuscript plan of the abbey of S. Gall sent to the

abbot. This plan, that Mabillon attributes to the abbot Eginnard, is certainly of the Carolvingian epoch (about 820).[1] It indicates the refectory beside the cloister and offosite t the church. (We give (Fig. 1) the facsimile of this part of the manuscript plan. At A is the portico beside the refectory G; at B is the portico beside the heated room of the monks; at C is that opening on the cells, and D is that placed beside the church. This plan is interesting because it indicates the place reserved for each portion of the members of the community. At a is marked the bent connection of the refectory with the kitchen F; at d are the tables of the monks with their b benches against the walls; at c is the pulpit of the reader; at b is the sideboard holding the vessels; at e is the table of the abbot and dignitaries; at f being the table of the guests. The corridor H communicates with the building reserved for provisions.

Note 1.p.8. Archives of abbey of S. Gall. -- See entire plan, Art. Architecture Monastique (Fig. 1); the Architecture Monastique by M. Albert Lenoir.

These general arrangements are found in all the great abbeys. The refectory is always in direct communication with the kitchen. It assumes the rectangular form, is habitually vaulted from the end of the 12 th century, either by a single span in bays, or on a row of columns. A pulpit is reserved for the reader at one of the longer sides of the parallellogram. Near the refectory and even sometimes at one of its sides is placed the lavatory[1] for the ablutions of the monks. When t the lavatory is not placed in a separate building, it consists of a rectangular vat placed beside the wall of the cloister or in the refectory itself. A recess in the masonry is arranged to receive it. One still sees niches for the lavatory at the abbey of Luzerne near Avranches, and at the abbey of Beaufort (Normandy). One of the most beautiful abbey refectories is that built at the beginning of the 13 th century in the Cluniac priory of S. Martin-des-Champs at Paris. That hall, whose composition is erroneously attributed to Pierre of Montereau, because when it was erected that master of works was still a child, consists of two rows of vaults resting on very delicate columns of lias stone. Beautiful windows with rosettes light it at the sides and ends. These are pierced in the

gables. The doorway of this refectory is in an admirable style and opens on the cloister opposite the lavatory placed in an angle of this cloister. A pulpit for the reader opens on a lo longer side (Art. Chaire, Fig. 3).[2] The abbey of S. Genevieve (now lyceum Napoleon) still retains its old refectory of the 13 th century; it is a great hall vaulted by pointed arches without a row of columns.

Note 1.p.10. Art. Lavabo. -- see Art. Lavoir, Dictionnaire du Mobilier francaise.

Note 2.p.10. The complete monograph of the refectory of S. Martin-des-Champs is engraved in the Statistique monumentale de Paris, after the drawings of the late Lassus. This refectory now serves as the library of the Conservatoire des arts et metiers.

The refectory of the abbey S. Germain-des-Pres at Paris was one of the remarkable works of Pierre of Montereau. Built about 1240 by abbot Simon, this refectory was 131.2 ft. long by 32.8 ft. wide. It had no middle row of columns and the crown of the vaults rose to nearly 52.5 ft. above the ground. Sixteen windows decorated by glass lighted it, eight on each side. According to D. Bouillart, its construction had a very slender appearance. The pulpit of the reader was well wrought and was supported on a corbel of hard stone composed of two courses ornamented by a perforated vine.[1] The refectory of the royal abbey of Poissy, built by Philip the Fair, was still larger; it was 154.2 ft. long by 39.4 ft. wide, and the crowns of the vaults were placed 65.6 ft. above the ground. It was an admirable structure of the 14 th century, that remained u until under the first empire. This refectory had no row of columns.

Note 1.p.11. See Histoire de S. Germain-des-Pres by D. Bouillart. p. 123.

Contrary to custom, the refectory of the royal abbey of Poissy was placed perpendicular to the church at the south end of the transept, otherwise looking into one side of the cloister.

Excepting some details, such as the lavatories and the pulpits of the readers, refectories were under the ordinary programmes of halls. We do not think it necessary to give illustrations of them here, which will find their place in the Article specially intended for halls (Salles). Then we refer o

our readers to that Article.

The refectories of communities in the middle ages no longer have anything analogous in our edifices, such as lyceums and seminaries. It is necessary to pass the Channel and go into England to find again in the old universitæes of Okford and Cambridge the vast sanitary and extended arrangements, that r recall those of our old refectories of French establishments. Also the refectories of English communities are covered by ceiled carpentry and are very rarely vaulted in masonry. The refectories of our great French establishments are now badly ventilated halls with low ceilings and stories over them, gl-oomy and staurated with a nauseous odor, causing one to regret the broad anf very extensive arrangements of the middle ages. We have something to learn from them in this.

Castles had no refectories, properly speaking. If a great number of guests were gathered, the great hall was transformed into a refectory, bu this occurred only on the occasion of certain solemnities. Garrisons were divided into posts and took their meals separately in each post, and the lord with his f family was served in the keeo or in his apartments.(Art. Salle).

REMPART. Rampart.

Arts. Architecture Militaire, Chateau, Courtine, Creneau, Hourd, Machicoulis, Siege.

REPOSOIR. Resting Place. Wayside Chapel.

This does not refer to those temporary structures of tapestry, erected to allow processions on Corpus Christi to stop for a few moments, but to small buildings erected beside the great roads to offer shelter to travelers, an asylum and a place for prayer. One still finds many of these edifices along the public ways in Italy, bu they have become very rare in France. It has been thought that they were advantageously rep-laced by the police sergeants, which is certain. But for that is is not necessary to destroy them.

Some of these monuments have beem converted into chapels, and the central provinces of France retain them under that n name. Yet these are no longer shelters opened during a storm, but a sacrarium to which on certain occasions the nearest pr-iest comes to say a mass. We know but one of these little str-

structures having the twofold purpose of a refuge and a place for prayer, preserved in the north of France. It is situated near Fimes at the side of the old Roman road going from Rheims to Soissons. Yet the upper part of this little monument was rebuilt at the end of the 16 th century. It was built by Enguerrand of Courcelles in 1265. We give its plan (Fig. 1). An altar filled the rear of the cell. A piscina is arranged in the right hand wall. A cross vault covers this cell, and the front wall is pierced by a doorway and two windows. We sketch at A the detail of the jamb of the doorway with one of the w windows. The door was only fastened with a latch, so as to p prevent animals from entering the cell. The windows were not glazed, but were furnished with vertical iron bars as indicated in the detail A. Fig. 2 gives the section of this shelter and Fig. 3 is its perspective with the restored roof.[1] Six g great old trees were probably replanted at the same places and formed a shade over the monument, that it seems was covered by slabs of stone, to offer safer shelter and to avoid repairs.

Note 1.p.13. M. Leblon, architect, courteously drew for us this curious shelter.

The two side niches were rebuilt in the 16 th century, but are without their statues, and the crucifix no longer exists, that we have replaced beneath the gable. But over the lintel of the door is still seen a little square niche designed to contain a lantern. A retaining wall with two stairways borders the public road and leaves a terrace before the little building.

RESTORATION. Restoration.

The word and the idea are modern. To restore an edifice is not to maintain, repair or rebuild it, but to reestablish it in a complete state, that perhaps may never have existed at a given moment. Only since the second quarter of our (19 th) century have men pretended to restore the edifices of another age, and we do not know that architectural restoration has b been clearly defined. Perhaps it is opportune to take an exact account of what must be understood by a restoration, for it seems that numerous uncertainties have covered the sense that is,,or should be attached to that operation.

We have said that the word and the fact are modern, and in

fact no civilization and no people in past time has intended to make restorations as we understand them today.

In Asia in former times as now, when a temple or palace suffered the injuries of time, it was either rebuilt or another was erected beside it. The old edifice was not destroyed on that account; it was left to the action of the centuries, that took possession of it as their property, to prey on it gradually. The Romans rebuilt but did not restore, and the proof is that Latin has no word that corresponds to our word restoration, according to the meaning given to it today. To renew, rebuild, renovate, does not mean to restore, but to reestablish, rebuild anew. When the emperor Hadrian claimed to replace in good condition a number of the monuments of ancient Greece or of Asia Minor, he proceeded in such fashion that he aroused against hemself all the archaeological societies of Europe, a although he had pretensions to the knowledge of antiquity. One cannot regard the reestablishment of the temple of the Sun at Baalbec as a restoration, but as a reconstrumtion according to the method adopted at the time when this occurred. The Ptolemies prided themselves on their archaism, but did not absolutely respect the forms of the monuments of the old dynasties of Egypt, restoring them according to the fashion of their own time. As for the Greeks, far from restoring, i.e., reproducing exactly the forms of the edifices that had suffered some dilapidations, they evidently thought to do better by g giving the stamp of the moment to these necessary works. To erect such an arch of triumph as that of Constantine at Rome, with fragments torn from the arch of Trajan, is neither a restoration nor a reconstruction; it is an act of vandalism, of barbarous pillage. To cover with stucco the architecture of the temple of Fortuna virilis at Rome cannot longer be regarded as a restoration, it is a mutilation.

The middle ages possessed the feeling for restoration no more than antiquity; far from that. If necessary to replace a broken capital in an edifice of the 12 th century, a capital of the 13 th, 14 th or 15 th century was set in its place. If on a long band of crockets of the 13 th century a single piece was lacking, an ornament in the taste of the moment was inserted. Thus it often happened before the careful study of the styles was carried to its last limits, that one was led to

regard these modifications as oddities, and a false date was given to fragments, that should have been regarded as interpolations in a text.

One could say that there was as much danger in restoring by reproducing in fac-simile everything found in an edifice, as by pretending to substituting for later forms those which must have existed primitively. In the first case, good faith and the sincerity of the architect may produce the gravest errors by consecrating an interpolation, so to speak; in the second the substitution of an earlier for an existing form equally r removes the traces of reparation, whose known cause might have proved the presence of an exceptional arrangement. We shall explain this immediately.

Our time, and our time alone since the beginning of the historical ages, has taken an unusual attitude in regard to the past. It has desired to analyze and compare it, classify it and form its true history, by following its course, progress and the transformation of humanity. Such a singular fact cannot be, as some superfecial minds suppose, a fashion, caprice or infirmity, for the phenomenon is complex. By his labors on comparative anatomy and his geological researches, Cuvier suddenly unveiled to the eyes of his contemporaries the history of the world before reign of man. The imagination followed n him with ardor in that new path. After him, philologists discovered the origins of the European languages, all derived from the same source. Ethnologists extended their labors to the s study of the races and their aptitudes. Then finally came the archaeologists, who from India to Egypt and Europe compare, discuss and separate the productions of art, unmask their origins and their affiliations, gradually by the analytical method coming to coordinate them according to certain laws. To see there a fantasy, a fashion and a state of moral uneasiness is rather to judge lightly of a fact of considerable importance. As well pretend that the facts unveiled by science since Newton are the result of a caprice of the human mind. If the fact be considerabel in its entirety, how could it be without importance in its details? All these labors are linked together and lend each other mutual aid. If the European has arrived at this phase of the human mind, that while proceeding more swiftly toward the destinies to come, and perhaps because he

advances rapidly, he feels the need of gathering all his past, just as one collects a numerous library to prepare for future labors, is it reasonable to accuse him of allowing himself to be carried away by a caprice, an ephemeral fancy? And then the laggards, the blind, do not they themselves disdain these studies, pretending to regard them as a useless trash? To dissipate prejudices, exhume forgotten truths, on the contrary, is not this one of the most active means for developing progress? Our time will only have to transmit to future ages this new method of studying the affairs of the past, either in the material or the moral order, to merit well from posterity. But we know something more; our time is not satisfied to cast a s scrutinizing glance behind it; this retrospective labor only develops the problems proposed on the future and facilitates their solution. Synthesis succeeds analysis.

However those investigators of the past, archaeologists patiently exhaming the least remains of the arts supposed to be lost, have to vanquish prejudices carefully entertained by the numerous class of persons for whom every discovery, or every new horizon is a loss of tradition, i.e., of a state of such comfortable quietude of mind. The story of Galileo is that of all times. It ascends in one or several steps, but one always finds it on the steps that humanity climbs. Let us remark in passing, that epoch marked by a great movement forward is particularly distinguished from others by at least a partial study of the past. The 12 th century in the West was a veritable renaissance, political, social, philosophical, of art and of literature; at the same time some men aided this movement by researches in the past. The 16 th century presents the same phenomenon. Archaeologists then do not have to disquiet themselves much at this period of delay, that men pretend to impose on them, for not only in France but in all Europe, their labors are appreciated by a public eager to penetrate with them into the depths of previous ages. That these archaeologists sometimes leave the dust of the past to cast themselves into polemics is not lost time, for polemics produces ideas and leads to more careful examination of doubtful problems; contradiction aids in solving them. Let us then not accuse th these minds immobilized in the contemplation of the present, or attached to prejudices decorated by the name of tradition,

of closing their eyes to the riches exhumed from the past, a and pretending to date humanity from the day of their birth, for we are thus forced to supplement their myopia and to show them more closely the result of our researches.

But what shall be said of those fanatics, seekers for certain treasures, never permitting one to dig in a soil that they have neglected, regarding the past as material to be exploited by the aid of a monopoly, and naughtily declaring that humanity has produced works worth collecting only during certain historical periods limited by themselves; who pretent to tear out entire chapters of the history of human labors; who raise themselves to become censors of the class of archaeologists, saying to them:- "such a vein is injurious, never dig there; if you gring it to light, we shall denounce you to your contemporaries as corruptors!" Thus were trreted a few years since, men devoting their days to uncovering the arts, customs and literature of the middle ages. If these fanatics have diminished in number, those that persist are only more passionate in their attacks, and they have adopted very skilful tactics to impose on persons little disposed to see the bottom of things. They reason thus:- "You study and pretend to acquaint us with the arts of the middle ages, then you wish to make us return to the middle ages, and you exclude the study of antiquity; if you are allowed to do this, there will be oubliettes in each jail and a torture chamber beside the sixth cell. You speak to us of the labors of the monks, and then you desire to subject us to the regime of the monks, to the tithe, to cause us to fall into an enervating asceticism. You speak to us of feudal castles, and then you desire the principles of 1789, and if one listens to you, levies of labor will be r reestablished." What is amusing is, that these fanatics (we retain the word) lavish on us the epithet of exclusive, probably because we do not exclude the study of the arts of the middle ages, and permit ourselves to recommend them.

Perhaps we shall be asked what relation these quarrels can have to the titel of this Article, which we are going to state. Architects in France do not hurry. Already about the end of the first quarter of the (19 th) century, literary studies of the middle ages had assumed a serious development, when the architects still saw in Gothic only the imitation of the for-

forests of Germany (this was the consecrated phrase) and in the pointed arch only a diseased art. The equilateral arch is broken, then it is sick, and this is conclusive. The churches of the middle ages were devastated during the revolution, abandoned, blackened by time, rotted by dampness, and presented only the appearance of great empty tombs. Hence the gloomy phrases of Kotzebue were repeated after him.[1] The interiors of Gothic edifices only inspired sadness (that is easy to believe in the state in which they had been put). The open pierced s pires isolated in the fog produced romantic periods; men described the stone lacework, the pinnacles set on the buttresses, the elegant little columns grouped to sustain the vaults at frightful heights. These evidences of piety (others call it fanaticism) of our fathers only reflect a sort of half mystical, half barbarous state, in which caprice reigns as master. Useless to extend further here on this common nonsence, that was the rage in 1825, and that one no longer finds except in the pages of belated journals. However this may be, these hollow phrases, aided by the Museum of French monmuents, and some collections like that of M. Sommerard, caused some artists to undertake to examine with curiosity these remains of centuries of ignorance and barbarism. This examination was rather superficial and timid at first, but no less aroused very harsh remonstrances. They concealed themselves to draw these monuments, erected to the Goths, as some grave personages stated. It was then that men, who were not artists, found themselves out of the reach of the academic ferule, and opened the campaign by labors very remarkable for the time at which they were made.

In 1830 M. Vitet was appointed inspector of historical monuments. That refined writer knew how to bring into these novel functions not the great archaeological knowledge, which no one then possessed, but a spirit of analysis and criticism, which at once caused light to penetrate into the history of our ancient monuments. In 1831 M. Vitet addressed to the minister of the interior a lucid anf methodical report on the inspection to which he had devoted himself in the department of Nord, that suddenly unveiled to enligh ened minds the treasures previously unknown, a report still regarded today as a masterpiece in this kind of studies. We shall ask permission to quote some extracts from it. "I know," says the author, "that in the

eyes of men having authority, it is a singular paradox,to speak seriously of the sculpture of the middle ages. To believe them, from the Antonines until Francis I, there has been no question of sculpture in Europe, and statuaries were only ignorant and rude masons. Yet it suffices to have eyes and a little good faith to do justice to this prejudice, and to recognize that on leaving the ages of pure barbarism, there arose in the middle ages a great and beautiful school of sculpture, heir of the procedures and even the style of antique a art, although entirely modern in its spirit and effects, and that like all schools had its phases and revolutions, i.e., its infancy, maturity and decadence."

"It is also necessary to esteem ourselves as fortunate, when chance has caused us to discover in a sheltered corner, where the blows of the hammer could not reach them, some fragments of this noble and beautiful sculpture." And as if to combat the influence of that sepulchral phraseology then employed, when it was necessary to describe the monuments of the middle ages, M. Vitet later expressed himself thus concerning the coloring applied to the architecture:- "In fact by recent journeys and incontestable experience, no longer allowing one to doubt today that ancient Greece carried the taste for color so far, that it covered by paintings even the exteriors of its edifices, and yet on the faith of some bits of faded marble o our learned men for three centuries have caused us to think of that architecture as cold and uncolored. The same has been done in regard to the middle ages. It has been found that at the end of the 16 th century, due to Protestantism, pedantry and many other causes, our imaginations becoming daily less vivid and natural, more dull, so to speak, men set themselves to whitewashing those beautiful painted churches, and they adopted a taste for entirely plain walls and woodwork, and if some interior decorations were still painted, this was only in miniature, so to speak. Since matters were such for two or three centuries, men became accustomed to believe that they had always been the same, and that these poor monuments had been seen in all times as pale and despoiled as they are today. But if you observe them carefully, you will very quickly discover some tatters of their ancient dress; everywhere that the whitewash scales off, you will find the primi-

primitive painting."

To close his report on the monuments of the provinces of the north visited by him, M. Vitet having been much struck by the imposing appearance of the ruins of the castle of Coucy, addressed to the minister of the interior this request, which today has a most striking appropriateness:- "In terminating here what concerns the monuments and their preservation, permit me, Mr. minister, to say a few words concerning a monument more astonishing and perhaps more precious than all those just mentioned, and whose restoration I propose to attempt. In truth this is a restoration for which are required neither stones nor cement, but only some sheets of paper. To reconstruct or rather restore in its entirety and in its least details a fortress of the middle ages, to reproduce its internal decoration and even its furniture; in brief to render its form, color and its primitive life, if i may dare to say so, s such is the project that came to my thoughts on entering within the walls of the castle of Coucy. Those immense towers, t that colossal keep, under certain aspects seem to have been built yesterday. And in their injured portions are now many vestiges of painting and sculpture, of internal arrangements! How many documents for the imagination! How many marks to guide with certainty to the discovery of the past, without counting on the ancient plans of the castle, which although incorrect, may also be of great assistance!"

"So far this sort of labor has only been applied to the monuments of antiquity. I believe that in the domain of the middle ages it might lead to even more useful results; for the indications based on more recent facts and monuments more entire, which are often conjectural in regard to antiquity, will become almost a certainty in regard to the middle ages; and for example, the restoration that I mention applied to the castle as it is today, I dare to believe will meet with little incredulity."

This programme so vividly sketched by the illustrious critic 35 years since, we see realized today, not on paper or in fugitive drawings, but in stone, wood and iron for a castle no less interesting, that of Pierrefonds. Many events have occurred since the report of the inspector general of historical monuments in 1831, many discussions of art have been raised,

yet the first seeds sown by M. Vitet have borne fruit. M. Vitet first occupied himself with the serious restoration of old monuments; he first expressed practical ideas on that subject; he was first to introduce criticism into this kind of works; the way being opened, other critics and learned men entered it, and later the artists.

Fourteen years later, the same writer was always devoted to the work that he had commenced so well, and wrote the history of the cathedral of Noyon and thus in that remarkable work,[1] he stated the stages passed over by the learned men and artists attached to the same studies. [2]"In fact to know the history of an art, it is not enough to determine the different periods that it has passed through in a given place, it is n necessary to follow its course in all the places in which it occurred, to indicate the varied forms that it successively assumed, and to draw up a table of all these varieties, not only paying attention to each nation, but to each province of the same country. It is for this twofold purpose, and in this spirit that have been directed nearly all the researches undertaken among us for 20 years in regard to the monuments of the middle ages. Already about the beginning od the century, some learned men of England and of Germany have given us the example by essays especially devoted to edifices of those two countries. Their labors no sooner penetrated into France, and particularly into Normandy, than they excited lively emulation. In Alsace, Lorraine, Languedoc, Boitou and all our provinces, the love of this sort of studies was rapidly propagated, and now wherever one labors and searches, he prepares and collects materials. Fashion slides over and concerns itself with novelties, frequently to spoil them, unfortunately never respected this growing science and perhaps compromised its progress somewhat. Men of the world are in haste to enjoy it; they have demanded expeditious methods in learning to assign its date to each monument that they see. On the other hand, some students were carried away by too much zeal, and fell into a dogmatism without proofs and armed with trenchant assertions, made incredulous thos that one pretends to convert. But in spiteof these obstacles inherent to all novel attempts, the real workers continued their labors with patience and moderation. The fundamental verities are acquired; the science exists, nothing

more is required but to consolidate and extend it, rejecting some still embarrassing notions, and finishing some incomplete demonstrations. There remains much to be done; but the results obtained are such that the aim must be definitely attained at some time."

Note 1.p.20. See monographie de l'eglise Notre Dame de Noyon by M. L. Vitet and D. Romee.

Note 2.p.20. Page. 38. The same.

It was necessary for us to cite the greater part of this t text to show how far its author had advanced in the study and appreciation of these mediaeval arts, and how the light appeared in the midst of the darkness scattered around him. After having clearly shown that the architecture of that time is a complete art with its own laws and reasons, M. Vitet said:-- "It is because the eyes are opened, that one treats all these verities as chimeras, and shuts himself up in a scornful incredulity."[1]

Note 1.p.21. The same. p. 45.

Then M. Vitet left the general inspection of historical monuments; after 1835 these functions were entrusted to M. Merimee, one of the most distinguished minds of our era.

Under these two godfathers was formed a primary nucleus of young artists desiring to penetrate into the intimate knowledge of those forgotten arts; under their wise inspiration, always subject to severe criticism, were undertaken restorations, at first with great reserve but soon with more boldness and in a more extended manner. From 1835 to 1848, M. Vitet presided over the commission of historical monuments, and during that period were studied a great number of edifices of Roman antiquity and of the middle ages in France, and also preserved from ruin. It must be stated that the programme of a restoration was then an entire novelty. In fact, without speaking of restorations made in the preceding centuries, and that were merely substitutions, already from the beginning of the century, men had attempted to give an idea of the earlier arts by compositions tolerably fantastic, but which pretended to reproduce the ancient forms. M. Lenoir in Musee des monuments f francais composed by him, had attempted to arrange all the fragments saved from destruction, in a chronological order. But it must be stated, that the imagination of the celebrated

curator intervened in the work rather than knowledge and criticism. Thus for example, the tomb of Heloise and Abelard, now transferred to the cemetery of the East, was composed of arches and little columns taken from the side aisles of the abbey church of S. Denis, with reliefs from the tombs of Philip And Louis, brother and son of S. Louis, with masks from the chapel of the Virgin of S. Germain-des-Pres, and two statues of the beginning of the 14 th century. Thus the statues of Charles V and of Jeanne de Bourbon taken from the tomb of S. Denis, were placed on woodwork of the 16 th century torn from the chapel of the chateau of Gaillon, and surmounted by a little structore of the end of the 13 th century; that the so-called hall of the 14 th century was decorated by an arcade taken from the rood loft of S. Chapelle, and the statues of the 13 th century were set against the piers of the same edifice; t that in the lack of a Louis IX and of Marguerite of Provence, the statues of Charles V and of Jeanne of Bourbon, which formerly ornamented the portal of the Celestins at Paris, were christened by the names of the saint king and his wife.[1] The Museum de monuments francais having been destroyed in 1816, confusion only increased among so many monuments, mostly transferred to S. Denis.

Note 1.p.22. Thes substitution has since caused, that nearly all painters or sculptors charged with representing these personages gave to S. Louis the face of Charles V.

By the desire of the emperor Napoleon I, who was in advance of his time in everything, and understood the importance of restorations, this church of S. Denis was not only intended to serve as the tomb of the new dynasty, but to offer a sort of specimen of the progress of art from the 13 th to the 16 th centuries in France. Funds were devoted by the emperor to that restoration, but the result so little corresponded to expectation from the first works, that the architect charged with the work must endure such strong reproaches from the sovereign, a and was so affected by them as to die of regret, it is said.

That unfortunate church of S. Denis was like a corpse on wh which practised the first artists, who entered on the path of restoration. For thirty years it suffered all possible mutilations, so much that its stability being compromised after considerable expenses, and its ancient arrangements had been

been modifeed, all the beautiful monuments contained in it b being overturned, it was necessary to cease that costly attempt, and to return to the programme fixed by the commission of historical monuments, in the matter of restoration.

It is the time to explain that programme, followed today in England and Germany, who preceded us in the course of theoretical studies of the ancient arts, accepted in Italy and Spain, who in turn claim to introduce criticism into the preservation of their old monuments.

This programme at the very first admits in principle that each edifice or each part of an edifice must be restored in the style that belonged to it, not only in appearance but also in structure. There are few edifices built at a single spurt, especially in the middle ages, or if they were, have not suffered notable modifications, either by additions, transformations or partial alterations. It is essential before every w work of restoration to determine exactly the age and character of each part, to compose a sort of statement based on sure documents, either by written notes of by mraphical drawings. Further, each province in France possesses a style belonging to it, a school whose principles and practical means it is n necessary to know. Data taken from a monument of Isle-de-France cannot then serve for restoring an edifice of Champagne or Burgundy. These differences in schools persist quite late; they are marked according to a law not regularly followed. T Thus for example, if the art of the 14 th century of Normandy closely approaches that of Isle-de-France at the same epoch, the Norman Renaissance essentially differs from the Renaissance of Paris and its vicinity. In some southern province, the so-called Gothic architecture was never more than an importation; hence for example, a Gothic edifice of Clermont may have come from one school and an edifice of Carcassonne of the same epoch from another. The architect charged with a restoration must then know accurately, no only the styles relating to e each period of art, but also the styles belonging to each sc school. Not alone during the middle ages are these differences observed; the same phenomenon appears in the monuments of Grecian and Roman antiquity. The Roman monuments of the Antonine epoch that cover the south of France differ in many points f from the monuments of Rome in the same epoch. The Roman of t

the eastern shore of the Adriatic cannot be confused with the Roman or central Italy, of Provence or or Syria.

But to restrict ourselves here to the middle ages, difficulties accumulate in the matter of restoration. Frequently monuments or parts of monuments of a certain epoch and of a certain school have been repaired at different times, and by artists not belonging to the province in which that edifice was built. Hence are considerable embarrassments. If necessary to restore both the primitive and the modified parts, is it necessary to take into account the latter and restore the deranged unity of style, or to reproduce exactly the whole with t the later modifications? Then the absolute adoption of one of the two methods may present dangers, and it is necessary on the contrary to act according to the particular circumstances, accepting neither of the two principles in an absolute manner. What are these special circumstances? We cannot indicate all of them; it suffices for us to mention some of the more important, so as to emphasize the critical side of the work. Above all and before being an archaeologist, the hrchitect charged with a restoration must be a skilful and experienced constructor, not only from the general point of view, but from the p particular point of view,; i.e., he must know the procedures of construction accepted at the different epochs of our art a and in the different schools. These procedures in construction have a relative value and are not all equally good. Some have even been abandoned because they were defective. Thus for example, a certain edifice built in the 12 th century had no gu.ters under the eaves of the roofs, must be restored in the 13 th century and equipped with gutters combined with d discharge pipes. The entire upper part is in bad condition and it is necessary to rebuild it entirely. Shall one suppress the gutters of the 13 th century and restore the old cornice of the 12 th century, whose elements are to be found elsewhere? Certainly not; it is necessary to reestablish the cornice with gutter of the 13 th century, retaining the form of that epoch, since one cannot find a cornice with gutter of the 12 th, and to establish an imaginary one with the pretense of giving it the charcater of the architecture of that epoch, would be to make an anachronism in stone. Another example: -- the vaults of a nave of the 12 th century were partly destroyed by some

accident and were rebuilt later, not in their primitive form but according to the method then accepted. The last vaults in turn threaten ruin and it is necessary to rebuild them. Shall one reestablish them in their later form or restore the primitive vaults? Yes, because there is no advantage in doing otherwise, and there is a considerable one in restoring its unity to the edifice. It is not necessary here as in the preceding case, to retain an improvement made to a defective system, b but to consider that the later restoration is made according to the old method, that in all repairing or restoration of an edifice consisted in adopting forms accepted at that time, that we proceed according to the opposite principle, consisting in restoring each edifice in the style peculiar to it. But those vaults of a character foreign to the primitive ones and that one must rebuild, are remarkably beautiful. They have been t the occasion of opening windows filled by beautiful glass, and they have been combined so as to unite with an entire system of external construction of great value. Shall one destroy all that to give himself the satisfaction of restoring the p primitive nave in its purity? Shall he store these glass windows in a storehouse? Shall he leave useless the external buttresses and flying buttresses that no longer have anything to support? Certainly not. Thus one sees that absolute principles in these matters lead to absurdity.

It is necessary to restore the underpinning of the isolated piers of a hall, which are crushed under their loads, because the materials employed are too fragile and in too thin courses. Some of these piers have been rebuilt at different times, and sections have been given to them, which are not those originally drawn. In rebuilding those piers, must we copy these different sections and retain the old heights of courses, that are too weak? No; we should reproduce the primitive sections of all these piers, and we should build them of large blocks to prevent the recurrence of the accidents, that caused our operations. But some of these piers have had their sections modified on account of a change i is desired to make in the monument; a change of great importance from the point of view of the progress of the art, for example as at Notre Dame of P Paris in the 14 th century. In restoring them, shall we destroy such an interesting trace of a project not entirely execu-

executed, but which denotes the tendencies of a school? No; we should reproduce them in their modified form, since these modifications can illustrate a point in the history od the art. In an edifice of the 13 th century, where the water is discharged over the coronas, as at the cathedral of Chartres, for a example, to better regulate this discharge, men must add gargoyles to the gutters during the 15 th century. These gargoyles are bad and it is necessary to replace them. Shall we substitute in their places gargoyles of the 13 th century under the pretext of unity? No; for we shall thus destroy the traces of in interesting primitive arrangement. On the contrary, we shall insist on the later restoration while retaining its style.

Between the buttresses of a nave were later added chapels. The walls beneath the windows of those chapels and the jambs of the openings are not connected in any manner with the much earlier buttresses, and they clearly show that these constructions were added later. It is necessary to rebuild, and the external surfaces of those buttresses are corroded by time, with the enclosures of the chapels. Must we connect these two constructions of different epochs that we restore at the same time? No; we should carefully preserve the separate masonry of the two parts, the lack of bond, so that one can always re-recognize that the chapels were added later between the buttresses.

Likewise in the concealed parts of edifices must we scrupulously respect all traces that can seive to show additions and modifications of the primitive arrangements.

There exist certain cathedrals in France among those rebuilt in the 12 th century, that had no transepts. For example, such are the cathedrals of Sens, Meaux, and Senlis. In the 14 th and 15 th centuries transepts were added to the naves by taking t two of their bays. These modifications were more or less skilfully made; but to trained eyes remain traces of the primitive arrangement. In similar cases the restorer must be scrupulous to excess, and he should emphasize the traces of these modifications rather than conceal them.

But it is necessary to make anew portions of monuments where no trace remains, either by the requirements of construction or to complete mutilated work, and then the architect charged with a restoration must be fully permeated by the style occu-

peculiar to the movement whose restoration is entrusted to him. A certain pinnacle of the 13 th century, copied from an edifice of the same time, would form a defect if you transfer it to another. A certain moulding on a little edifice will clash if applied to a large one. It is further a gross error to believe that a member of the architecture of the middle ages can be enlarged or diminished with impunity. In that architecture, each member is at the scale of the monument for which it is designed. To change this scale is to deform the member. And on this subject we remark that most Gothic monuments erected today frequently reproduce known edifices at a different scale. A certain church will be a reduction of the cathedral of Chartres, another being that of the church S. Ouen of Rouen. This is to start from a principle opposed to that accepted with so much reason by the masters of the middle ages. But if these defects are shocking in new edifices and take away all their value, they are monstrous when it concerns restorations. Each monument of the middle ages has its scale relative to the entirety, although that scale be always subject to the dimensions of man. It is then necessary to look twice, when necessary to complete the parts lacking to an edifice of the middle ages, and to be well imbued with the scale adopted by the primitive construction.

In restorations is one dominan condition, that must always be presented to the mind. This is to substitute for every part removed only the best materials and the most energetic or perfect means. It is necessary for a restored edifice to have a longer life in future, than that already elapsed. It cannot be denied that every work of restoration is a very severe test of the construction. Scaffolds, shores, the necessary removals, the partial changes in the masonry, cause in the work shocks that sometimes have occasioned very serious accidents. It is then prudent to count that every structure has lost a certain part of its strength because of these shocks, and that you must supplement this loss of strength by the power of the new parts, by improvements in the system of construction, by well considered anchors, and by greater resistances. It is useless to state that the choice of materials enters as a great part into the works of restoration. Many edifices threaten ruin only by the weakness or poor qualtty of the materials employed.

employed. Every stone removed must then be replaced by a stone of superior quality. Every system of cramps removed must be renewed by a continuous anchoring set in the place occupied by those cramps; for one cannot modify the conditions of equilibrium of a monument that has existed for six or seven centuries, without running risks. Structures like persons, acquire certain habits of existence with which it is necessary to count. They have their temperament (if one can so express it), which it is necessary to study and know well, before undertaking a regular treatment. The nature of the materials, the quality of the mortar, the soil, the general system of construction by vertical points of support or by horizontal connections, the weight of the more or less concretion of the vaults, the greater or lesser elasticity of the structure, constitute different temperaments. In a certain edifice where the vertical points of support are strongly stiffened by columns set on e edge, as for example in Burgundy, structures behave quite differently from an edifice of Normandy or Picardy, where the e entire structure is built of little and low courses. The means of repairs and shoring that succeed here will cause accidents elsewhere. If one can remove with impunity by parts a pier e entirely composed of low courses, the same work executed behind columns on end will cause fractures. Then it will be necessary to cram the mortar joints by the aid of iron tools and blows of a hammer to avoid all settlement, however small; that it is even necessary in certain cases to remove the monolithic columns during the rebuilding of the courses, to replace them after the entire work on the foundations is finished and has had time to settle.

If the architect charged with the restoration of an edifice must know the forms and the styles belonging to that edifice and to the school from which it came, if possible he must know even better its construction, anatomy and temperament, for b before all he must make it live. He must have penetrated into all parts of the structure, just as if he had dissected it, a and having acquired that knowledge, he must have at his disposal several means for undertaking the work of restoration. If one of these means fails, a second and a third must be ready.

Do not forget that the monuments of the middle ages are not

constructed like the monuments of Roman antiquity, whose structure proceeds by passive resistances, opposed to active forces. In the structures of the middle ages every member acts. If the arch thrusts, the flying buttresses and buttresses abut it. If an impost crushes, it does not suffice to shore it vertically, but it is necessary to provide for the various thrusts that act on it in different senses. If an arch is deformed, it does not suffice to place a centering under it, for it serves to abut other arches acting obliquely. If you remove any load from a pier, this load exerts a pressure that must be re-replaced. In brief, you do not resist inert forces acting vertically, but forces all acting in opposed senses, to establish equilibrium; each removal of a part thus tends to derange that equilibrium. If these problems set for the restores disturb and embarrass at each instant the constructor, who has not fo formed an exact appreciation of these conditions of equilibrium, they become a stimulant for him that well knows the edifice to be repaired. It is a war, a series of manoeuvres to be modified daily by constant observation of the effects that are produced. For example, we have seen towers established on four points of support carry the loads sometimes on one point and sometimes on another, because of repairs in foundations, and whose axis changed its point of horizontal projection some inches in 24 hours.

These are results with which the experienced architect plays, but on condition of always having the means for preventing an accident, on condition of inspiring confidence in the workmen, so that panics cannot take from you the means of preparing for any event, without delays and without experiments, manifesting no fears. In these difficult cases that often present themselves during restorations, the architect must have foreseen everything, even the most unexpected results, and he must have in reserve without haste or trouble the means for preventing disastrous consequences. Let us say that in this sort of works the workmen, who with us understand very well the manoeuvres directed for them, show as much confidence and devotion, when they have experienced the foresight and coolness of the chief, as they exhibit mistrust when they perceive the appearance of trouble in the orders given.

The works of restoration that from the serious and practical

point of view belong to our time will do him honor. They have forced architects to enlarge their knowledge, to seek energetic, expeditious and safe means; to place themselves in more direct relations with building artizans, also to instruct them to form groups, either in the provinces or in Paris, that may supply in all cases the best workmen in the great yards.

By these works of restoration important industries are improved, [1] that the execution of masonry has become more careful, that the use of materials has extended; for the architects charged with works of restoration, often in unknown villages without anything, have had to seek quarries, to reopen old ones at need and to build workshops. Far from finding all the resources supplied by the great centres, they must create and t train workmen, establish regular methods, both in accounts a and in the direction of the yards. Thus unused materials have been utilized; regular methods have been extended in departments without them; centres of workmen made capable have furnished men for an extended radius; the habit of solving difficulties in construction have been introduced among people s scarcely knowing how to build the simplest houses. French administrative centralization has merits and advantages, that we cannot contest, it has cemented political unity; but it is unnecessary to conceal its inconveniences. To speak here of architecture alone, centralization has not only taken from the provinces their schools, and with these their special methods, and the local industries, but also the capable men, who all come to be absorbed in Paris or in two or three great centres; so that indeed in the chief places of a department thirty years since was found neither architect, contractor, foremen, or workmen able to direct or execute works, of some little importance. To have the proo of what we say here, it suffices to look at the church, mayor's office, markets, hospitals, etc., built from 1815 to 1835, that have remained standing in the cities of the provinces (for many had but a brief duration). Nine tenths of these edifices (we do not speak of their style) emphasize a lamentable ignorance of the most elementary principles of construction. In the matter of architecture, centralization leads to barbarism. Knowledge, traditions, methods and material execution gradually withdrew from the extremities. If even at Paris a school directed toward a useful and practi-

practical purpose had been able to return to the distant members artists capable of directing constructors, the provincial schools would no less have been lost, but there would have been sent over the territory men, like what is seen in the service of bridges and roads, maintaining at an equal level all constructions undertaken in the departments. The school of architecture established at Paris alone thought quite differently; it trained laurates for the Academy of France at Rome, good designers, nourished on chimeras, very little fitted to direct a workyard in France in the 19 th century. These chosen men having returned to their natal soil after an exile of five years, during which they had drawn some antique monuments, h having never had to contend with the practical difficulties of the profession, preferred to remain at Paris and wait till there should be entrusted to them a work worthy of their talent, rather than take up the daily labor offered by the provinces. If some of them returned to the departmentr, this was only to occupy superior positions in our larger cities. Secondary localities thus remained entirely outside all advance in art. And all knowledge, and saw themselves compelled to entrust the direction of municipal works to superintendents of bridges and roads, surveyors, even schoolmasters with a little geometry. Certainly the first thought of saving from ruin th e most beautiful edifices on our soil, a legacy from the past, and which organized the service of historical monuments, only acted under an inspiration of artists. They were frightened by the destruction that menaced all those remarkable remains, and acts of vandalism perpetrated daily with the blindest indifference; but they could not foresee at first all the considerable results of their work, from the purely useful point of view. Yet they did not delay to recognize, that the more the works executed by them were placed in isolated localities, the more the good influence of those works made itself felt and radiated, so to speak. After some years, localities in which fine quarries were no longer worked, where was found neither a stonecutter, carpenter or a blacksmith only able to make horseshoes, supplied to all adjoining districts excellent workmen, economical and safe methods, had seen produced good contractors, skilful stonecutters, and inaugurated principles of order and regularity in the administration of the works. Some of t

those yards saw most of their stonecutters supply foremen for a great number of workshops. Happily, if in our country routine reigns as master at the top, it is easy to conquer it below with persistence and care. Because our workmen are intelligent, they recognize little but the power of intelligence. Just as they are negligent and indifferent on a yard, where the wages is the sole recompense and discipline is the sole means of a action, they are active and careful where they feel a methodical direction, certain in its attraction: where one takes the trouble to explain the advantage or inconvenience of some method. Self interest is the most energetic stimulant with those men devoted to manual labor, and by addressing their i intelligence and reason, he can obtain anything.

Thus with what interest architects attached to this work of restoration of our ancient monuments follow from week to week the progress of these workmen gradually acquiring a love for their work in which they participate. It would be ingratitude on our part not to state in these pages the feelings of disinterestedness and devotion very frequently manifested by these workmen in our yards of restoration, the enthusiasm with which they aid us to conquer difficulties that seem insurmountable, even the dangers that they daily incur, when they once see the aim to be attained. We find these qualities in our soldiers, is it surprising that they exist in our workmen?

Note 1.p.28. It is not these workshops of restoration that the industries of fine forged ironwork, of whought leadwork and of joinery comprise the construction proper; art glass a and mural painting are elevated from the state of debasement into which they had fallen at the beginning of the (19 th) century. It would be interesting to give a list of all the workshops to which the most ardent columniators of this sort of undertakings have come to seek workmen and methods. The m motive will be understood that forbids us to furnish a document of that nature.

The works of restoration undertaken in France, at first under the direction of the commission of historical monuments, and later by the building services called diocesan, then have not only saved from ruin the works of incontestable value, but have rendered an immediate service. The work of the commission has thus opposed to a certain point the dangers of administra-

administrative centralization in the matter of public works; it has restored to the provinces what the Ecole des Beaux Arts knew not how to give them. In the presence of these results, whose importance we are far from exagerrating, if some of those doctors that claim to dominate the art of architecture w without having caused a brick to be set, decree from the depths of their offices, that those artists who have passed a part of their existence in this dangerous and toilsome labor, from which for most of the time one receives neither great honor nor profit, are not architects; if they seek to condemn t them to a sort of ostracism and to remove them from works both more honorable and more faithful, and especially less difficult, their acts and their disdain will be forgotten.in the long t time, that those edifices, one of the glories of our country, are preserved from ruin end still stand for centuries, as evidence of the devotion of some men more devoted to perpetuate that glory than their personal interests.

We have only glanced in a general way at the difficulties presented to the architect in charge of a restoration, and as we have stated at first, these indicate a general programme made by critical minds. Yet those difficulties are not limited to purely material facts. Since all edifices whose restoration is undertaken have a purpose and are devoted to a service, one cannot neglect this utility side to devote himself to the part of a restorer of old a rangements now out of use. Leaving the hands of the architect, the edifice must not be less convenient than it was before the restoration. Very frequently theoretical archaeologists do not take into account these requirements, and strongly blame the architect for having yielded to present needs, as if the monument entrusted to him were his property, and as if he did not have to satisfy the programme given to him.

But it is in these circumstances that generally occur, that the sagacity of the architect must be exerted. He always has the means of harmonizing his part as restorer with that of the artist charged to satisfy unforeseen needs. Besides the best means for preserving an edifice is to find a purpose for it, and to satisfy so well all the needs required by that purpose, that there is no opportunity to make changes. Dor example, it is clear that the architect charged to make if the beautiful

refectory of S. Martin-des-Champs a library for the school of arts and trades, while respecting the edifice and even not r not restoring it, he must compel himself to arrange the cases so, that it will never be necessary to return there to alter the arrangement of the hall.

In similar circumstances, the best is to place one's self in the place of the primitive architect, and to suppose wha he would do, if he returned to the world, and the programme were set for him that is placed for us. But one understands that then it is necessary to have all the resources that those old masters possessed, and that it is necessary to proceed as they proceeded. Happily that art of the middle ages, restricted to some narrow formulas by those not acquainted with it, on the contrary when one is permeated by it is so flexible and subtle, so extended and free in its means of execution, that there is no programme that cannot be fulfilled. It is based on principles and not on formulas; it can be of all times and satisfy all needs, just ar a well arranged language can express all ideas without erring in its grammar. It is then this grammar that must be thoroughly possessed.

We grant that the slope is slippery from the moment that one does not hold to literal reproduction, that this method must not be adopted except in the last extremity; but it must also be agreed, that this is sometimes commanded by imperative necessities, to which one will not be allowed to oppose a "c "cannot." That an architect refuses to distribute gas pipes in a church, to prevent mutilations and accidents, is intelligible, because one can light the edifice by other means, but for example, if he will not lead himself to the establishment of heating apparatus, from the pretext that the middle ages did not adopt that system of heating in religious edifices, and that he thus compels the believers to take cold on account of archaeology, that falls into the ridiculous. These means of heating require chimney flues, and he must proceed as would have done a master of the middle ages, had he been obliged to establish it, and especially not seek to disguise that new m member, since the old masters were far from concealing a need, but on the contrary sought to clothe it with a form suited to it, even making of this material necessity a motive of decoration. Having to rebuilt anew the roof of an edifice, the arch-

architect rejects iron construction, because the masters of the middle ages never made iron frameworks, and this is in our opinion wrong, since he would thus avoid the great dangers of fire, that so many times have been fatal to our old monuments. But then must he not take into account the arrangement of the points of support? Ought he to change the conditions of weight? If the wooden carpentry is to be replaced loads the walls uniformly, should he seek a system of construction in iron, that presents the same advantages? Certainly he must, and particularly he will arrange that the iron roof will not weigh more than the wooden roof. That is a main point. Men have too frequently regretted having overloaded old structures; having restored the upper parts of edifices with materials heavier than those first employed. This forgetfulness a and negligence have caused more than one disaster. We cannot repeat too frequently, the monuments of the middle ages are wisely calculated and their organism is delicate. Nothing too much in their works, nothing useless; if you change one of t the conditions of that organism, you modify all the others. Some mention that as a defect; as for us it is a quality neglected a little too much in our modern structures, from which one could remove more than one member without compromising t their existence. Indeed, what would be the use of science and calculation, if not in the matter of construction to put into a structure only just the necessary strength? Why are those columns, if we can remove them without danger to the stability of the work? Why those costly walls 6.6 ft. thick, if walls 1.6 ft., reinforced at distances by buttresses 10.8 sq. ft. in section, offer sufficient stability? In the structure of the middle ages every part of the work fulfilled a function and had an action. The architect must endeavor to know exactly the value of both before undertaking anything. He must act like the skilful operator, who touches an organ only after having acquired entire knowledge of its function, and only after having foreseen the immediate or future consequences of his operation. If he acts by chance, he had better abstain. Better allow the invalid to die than to kill him.

Photography daily assumes a more serious place in scientific studies, and it seems to come to the point of aiding this great work of the restoration of old edifices, with which all

Europe is now occupied.

Indeed, when the architects had at their disposal only the ordinary means of drawing, even those most exact like the camera lucida, for example, it would indeed have been difficult not to make some omissions; not to neglect certain lines scarcely visible. Further, the work of restoration being completed, men could always dispute the accuracy of graphical representations, and what is termed the actual condition. But photography presents this advantage of making indisputable representations, the documents that can be constantly consulted, even when the restorations lack traces left by the ruin. Photography has also naturally led the architects to be more scrupulous in their respect for the least remains of an old arrangement, to take a better account of the construction, and it furnishes them with a permanent means of justifying their operations. In restorations one then cannot use photography too much, for very frequently one discovers on a print what he had not perceived on the monument itself.

In the matter of restoration, it is a dominant principle f from which one shoul not vary under any pretext, which is to take into account every trace indicating an a rangement. The architect must not be entirely satisfied, and must set the workmen a work only when he has found the combination, that best and most simply arranges itself with the trace left visible; to decide on an arrangement at first without having surrounded himself with all the data that must control him, is to fall into a hypothesis, and nothing is more dangerous than a hypothesis in works of restoration. If you have the misfortune to adopt on one point an arrangement, that varies from the true one, from that followed primitively, you are carried by a series of deductions into a false course, that it will be impossible to leave, and the better you reason in that case, the more you will wander from the truth. Thus for example, where it is necessary to complete a partly ruined edifice; before commencing i is necessary to excavate and examine everything, to collect the least fragments while taking care to note the point where discovered, and to set to work only when all this debris has logically found its purpose, and like the pieces of a game of patience. Without this care, one prepares for himself the worst deceptions, and some fragment found after

the restoration is completed clearly proves that you were mistaken. On these fragments picked up in the trenches, it is n necessary to examine the setting beds, joints and cutting; f for a certain chiseling could only be done to produce a certain effect at a certain height. The manner in which these fragments fell may often indicate the place that they occupied. In these dangerous cases of reconstruction of parts of demolished edifices, the architect must then be present during the excavations, entrusting them to intelligent laborers. In erecting the new construction, he must replace the old fragments so far as possible, even if they are changed; it is a guarantee that he gives, both of the sincerity and accuracy of his researches.

We have said enough of this to cause one to understand the difficulties, that meet the architect charged with the restoration, if he takes his functions seriously, and if the desires not only to appear sincere, but to complete his work with the certainty of having left nothing to chance, and of having always sought not to deceive himself.

RETABLE. Reredos.

We explained in Article Autel how reredoses did not exist on the altars of the primitive Church. Thiers,[1] to whom it is always well to resort when the ancient liturgy is concerned, thus expresses himself in regard to reredoses:- "The ancient altars that had simplicity as a special character were so arranged, that the bishops or priests who celebrated there the divine mysteries, and the persons behind them could see each other. Here are two reasons that appear to me worthy of consideration."

Note 1.p.34. J. B. Thiers. Diss. eccles. sur les princ. outels des eglises. p. 181.

"The first is taken from the seats or episcopal thrones. Th These seats were placed behind the altars, so that the prelates could sit there, and being seated could have in view their clergy and their people. Thus where there were episcopal seats, there were no reredoses; there were episcopal seats at l least in all cathedral churches."

"The second reason is taken from the ancient ceremony, for which at solemn masses the sub-deacon, after the oblation, r

retired behind the altar with the paten, that he held conceal-ed while still looking at the celebrant."

"Now the reredos being a back placed on an altar table, and thus forming a sort of screen before the celebrant, the rere-doses were then placed on the principal altars only after the epoch at which the choirs and episcopal seats were establish-ed in front, and not around the apse. Even then, at least in the cathedrals, the reredos was rarely adopted for the main altars. (Art. Autel). In his Dictionnaire, Quatremere de Quin-cy thus defines the reredos (retable):- "An architectural work made of marble, stone or wood, that forms the decoration of an altar against a wall." There is a manifest error. At first the altar must not and could not be against a wall, since cer-tain ceremonies required one to pass around it; then the rere-dor was not and could not be what one terms an architectural work, but indeed a simple back decorated by reliefs and pain-tings.

The primitive altars were only a table placed horizontally on isolated piers, a table on which in the Greek as well as in the Western church until in the 14 th century, were placed the Gospel and ciborium at the moment of the office. In the choir the celebrant could thus be seen from all parts of the apse. But about the end of the 11 th century in the West, wi-thout ever attaching the altars to the surface of a wall, si-nce certain ceremonies required one to pass around them, a r reredos was sometimes placed on an altar to form behind it a recess suitable to contain the relics. Those reredoses were even most frequently movable,[1] goldsmith's work or of wood, sometimes covered by fabrics.[2] We have to occupy ourselves here only with fixed reredoses, and we know none in France, that may precede the beginning of the 12 th century. That gi-ven here (Fig. 1) is one of the most interesting. It belongs to the little church of Carriere-S.-Denis near Paris and dat-es from that epoch. It is cut in three blocks of lias stone, and represents at the centre the Virgin holding the child Je-sus on her knees; at the left is the annunciation and on the right the baptism of the Saviour. A rich scroll encloses the relief at the sdes and bottom.

Note 1.p.35. Se Dictionnaire du Mobilier francais. Article Retable.

Note 2.p.35. See in Art. Autel the morning altar of S. Denis (Fig. 7), the altars of the cathedral of Arras and of Paris. (Figs. 8, 9).

This reredos has but a small thickness; it is a carved slab that masks a case or box, a reliquary.[3] One can place on it neither a crucifix nor candles. Indeed, it was not much later that the crucifix was placed on the reredos; till in the 16 th century it was placed on the altar. The candles were placed on the steps beside the altar, on an adjoining table, or sometimes on the table itself of the altar. As for the main altars of the cathedrals, as we have stated, they had no fixed reredoses; many even did not possess movable ones; they consisted of a simple table on columns. Reredoses seem to have been more particularly adopted at first in monastic churches, that possessed numerous relics, and that suspended them over and behind the altar. We have indicated in Art. Autel (Figs. 13, 13 bis, 14, 15 and 16), how those reliquaries were arranged, and how believers could place themselves below them in certain cases.[1] That arrangement required reredoses thus serving as a support for the slab on which was placed the reliquary, and that formed a sort of recess. (Autel, Figs. 14, 15, 16).

Note 3.p.35. This reredos, taken from the church of Carriere-S. Denis, was replaced in 1847 in the edifice by the care of the commission of historical monuments. It is well preserved; a part of the lower ornament alone is broken.

Note 1.p.36. See the arrangement of the altars of the chapels of the Holy Virgin and of S. Eustatio at S. Denis. (Figs. 13,17)

Here (Fig. 2) is one of the positions frequently adopted for the secondary altars of churches. The reredos masks and conceals the reliquary, beneath which one can place himself according to ancient custom, to obtain the healing of certain infirmities. This example was taken from a representation of the altar of relics of the church of Erstein, and indicates the utility of the reredos. Later the reliquaries were placed on the reredos itself, and that usage is still retained in some churches.

One understands how after the 13 th century in France, the reredoses became for sculptors a precious motive of decoration. And indeed, those artists composed a considerable number of them. Usually on a reredos was represented the legend of the

saint under whose name was placed the altar. Those reliefs with figures of small dimensions are executed with great delicacy, and are sometimes impressed with a beautiful style. There is little work of a better character than the reredos of the chapel of S. Germer, now deposited in the Museum of Cluny. The church S. Denis possesses charming reredoses of lias with grounds of glass, or enriched by paintings and gilded network. Those reliefs are enclosed by a moulding and are of rectangular form; the door of the tabernacle never opens at their middle. The custom of tablernacles so arranged only dates back two centuries.[1] The clergy of the middle ages in France did not think that these masses of ornaments, candles, vases and ciborium cases, with which are now heaped the altars of our churches, equaled a simple and calm arrangement, easily seen at a glance and with a truly monumental appearance.

Note 1.p.37. See Art. Tabernacle. Dictionnaire du Mobilier francois.

ROSACE. Rosette. Rose.

In ornamental sculpture this signifies a group of leaves fo forming a symmetrical composition inscribed within a circle, trefoil or quatrefoil. The architects of the middle ages caused the use of rosettes to decorate the soffits of cornices during the Romanesque period; gables, the surfaces of blind a arches or blind openings during the Gothic period; and tympanums. This sort of ornaments is frequently of beautiful character and excellent execution, particularly during the first Gothic period. One example will suffice here to explain the ornament named rosette. This (Fig. 1) is inscribed in a trefoil and is taken from the arcade of the chapel of the Virgin, built on the chevet of the cathedral of Seez, and dates from about 1230. Among all the schools of France, Norman architecture is most lavish with rosettes. Very beautiful ones are s seen on the tympanums of the triforium of the choir of the c cathedral of Mans. We shall have occasion to present examples of this kind of sculptured ornamentation in Art. Sculpture d' Ornement.

ROSE. Rose. Rose Window. Wheel Window.

ROSE. Rose. Rose Window. Wheel Window.

This name is given to a circular opening pierced in the walls of churches of the middle ages. The eye of the primitive Christian basilica, pierced in the gable raised over the entrance, appears to be the origin of the rose window of the middle ages. But until about the end of the 12 th century the rose is only an opening of small diameter without a stone sash; it is a c circular opening. The French Romanesque architecture of the North and South rarely employs that kind of window, which then scarcely has more than 1.6 to 3.3 ft. diameter. But after the second half of the 12 th century, when the lay school developed,rose windows appeared and assumed greater dimensions until the middle of the 13 th century. Then particularly in Isle-de-France and the adjacent provinces such as Champagne a and Picardy, rose windows opened under the vaults for the entire width of the naves. In Normandy and Burgundy on the contrary, rose windows appeared later, i.e., about the end of t the 13 th century.

The circular opening belongs to all epochs of architecture, since the late empire. But from the Romanesque eye often without glass [1] to the western rose window of the cathedral of P Paris is an advance. How was that advance accomplished? Why was the circular form adopted? Such are the questions asked, and to which it is necessary to reply. We must distinguish b between rose windows, those that open in the gable walls, from those having but a secondary importance.

Note 1.p.39. Art. Fenetre. Figs. 1, 2, 3, 6.

For example, one understands that in a great nave like that of the cathedral of Paris (Art. Cathedrale, Figs. 2, 4), if one desires to make openings above the gallery of the triforium to lighten the construction and to furnish light under t the roof of that gallery, it would have been unsightly to g give those openings the form of a window. On the contrary the rose window made the construction lighter by shoring the piers, and gave these openings a particular appearance, that distinguished them from the glazed windous.

For these secondary rose windows, the idea of shoring the piers while making them lighter must have imposed the circular form,in many cases. Thus for example, at the base of the towers of the cathedral of Laon the architect has made round op-

openings by preference to openings with jambs, to give more strength to the work.

But these circular openings were very cheerless, from the moment that they attained a diameter of 9.8 to 13.1 ft., particularly if not glazed, as above the triforium at Notre Dame of Paris. The architects then thought of filling them with s stone tracery more or less rich. If those rose windows were destroyed to be glazed, this stone tracery supported the glass, like a sash of wood or iron and could resist the pressure of the wind.

We cannot state today whether the gables of the transepts of the cathedral of Paris, built under Maurice de Sully, were or should be pierced by rose windows. That is however probable; we even think that one of those rose windows existed at the south side, for in the masonry rebuilt in the 13 th century at that side, we have found fragments used in the concrete, and that could only have belonged to a rose window of great dimensions. Assuming that this rose window existed, it would date from about 1180 and would be one of the oldest known, in dimensions unusual until then. Indeed the rose windows dating from that epoch rarely exceed 16.4 or 19.7 ft. diam.

With the lack of great rose windows with stone sashes preceding 1190, we find small ones pierced in the choir of Notre Dame of Paris to light the triforium, and which date from 1165 to 1170, since in the year 1170 the abbot of Mount S. Michel-en-Mer relates that he saw this vaulted choir. Those rose windows had already been suppressed about 1230, when it was desired to enlarge the high windows of the choir, and which opened beneath the roofs of the gallery of the second story, as we have already stated.

There exist three different models of stone sashes that fill those rose windows in the choir. We give one of them (Fig. 1); the circular opening is 9.4 ft. diameter, and the stone sash of very irregular design is composed of only 8 pieces, that are set like the spokes of a wheel extending 0.4 or 0.8 inch into the intrados of the voussoirs forming the circle. If these roses were glazed like those lighting the triforium, the panels of glass would be simply held by pins fixed in the inner faces of the stones forming the sash. But we shall soon return to this arrangement. The rose sketched here is one of those

opening under the roof of the gallery, and was not filled by glass, its ornamented face being presented to the interior. This ornamentation consists of diamont poin s sunk and projecting, the latter cut into little leaves (dogtooth) and little knobs, as indicated by the detail B and the section C. O One will note that the radials A diminish laterally and terminate next the internal eye with two little corbels forming a cap, to present a more stable shore. Indeed, what especially merits observation in this composition of a stone sash is the system of shoring, well arranged to prevent all fracture and to hold the voussoirs of the circle just as the spokes of the wheel support the rim.

This principle evidently determined the composition of the stone sashes of the first great rose windows in the architecture of Isle-de-France, and it must be recognized as excellent. One of the oldest of the great rose windows is certainly that ofened in the western facade of the cathedral of Mantes, a c church built at the same time as the cathedral of Paris, perhaps by the same architect, and that reproduces its general arrangements, its mode of construction and some of its detail s.

But we should first state the motive that caused the adoption of those great circular openings. When the lay school inaugurated its system of architecture during the second half of the 12 th century, it was principally occupied with the construction of vaults. It had that since the cross vault transferred its entire load to the imposts and consequently the piers, the walls became useless. If at the cathedral of Paris the primitive high windows did not exactly fill the entire space left under the side arches of the vaults, if there was some hesitation in the construction of these openings, and if one still sees the remains of tympanums, these remains are so reduced, that one understands how they must soon disappear, and ho. the side arches themselves would become the archivolts of the windows. If one then arranged all the tympanums beneath the side arches, in consequence of ver. proper r reasoning, if the walls at the sides were suppressed, it was logical to suppress them beneath the great side arches of the facade, giving the projection of the trans.er.e arches. But those trans.erse arches were pointed or broken arches. The architects the. adopted the method of not making the front

side arch the projection of the transverse arches. For these side arches they soon adopted the round arch; thus they obtained a semicircle instead of a pointed arch, that further could not hinder them in the construction of the vaults; and completing this semicircle, they opened a great circular window occupying the entire width of the vault, giving its projection on the exterior. It was then only necessary to fill t this great circular opening by a stone sash permitting the s setting of the glass. It is this circular opening that Villard of Honnecourt calls a round glass window.

Although the transverse arches of the great vaults of the cathedrals of Paris and of Laon, of the churches of Mantes a and the abbey church of Braisne are pointed, the side arches of those vaults forming the gable walls are round, so as to inscribe a circular rose window beneath the side arch, which becomes a great relieving arch.

Here is the history of the transformations of the great rose windows traced in a few lines (Fig. 2).

As we have just stated (Example A), at first the projection of the internal vault is expressed by a round arch, although the transverse arches of the vault may be pointed. Yet about the middle of the 13 th century, it seems that in Champagne, a province where the consequences of the lay architecture are carried beyond measure, they desired to avoid this mixture of the round and pointed arches, or rather that it was illogical to give externally a round arch as the projection of a pointed vault. The architect of the cathedral of Rheims inscribes the great rose windows beneath a pointed arch as shown by example B; and as if to make better felt the projection of the transverse arches of the vault, the space a is opened. The space a is opened. The round glass window is then nothing more than a vast window opened beneath the great side arch. This is no l longer the rose window of Isle-de-France. In the last province, the cradle of the lay school of the 13 th century, until the end of the 13 th century the rose window remained the round glass window, i.e., it continued to be circular and circumscribed by a round side arch. Such are the rose windows of the transept gables of the cathedral of Paris, that date from 1257. But at that epoch this circle of the rose is inscribed within a square, as shown by example C. The angles b are bl-

blind and the lower corners c are opened above a window of w which we shall soon speak. At the same epoch men went farther; the side arch of the vault was separated and became a last transverse arch. There was left a space between this last arch and the rose, and not only was the round glass window opened, but also the upper corners b. Thus is constructed the rose wi window of the S. Chapelle of the castle of S. Germain-en-Laye, that we shall describe in detail.

Let us resume the chronological order and examine the first great rose windows, that have remained to us.

We have just stated, that one of the oldest is that opened in the western facade of the church of Mantes. The construction of that rose dates back to the last years of the 12 th century, i.e., it is nearly contemporaneous with the little rose window of t e triforium of Notre Dame of Paris, that we have given in Fig. 1.

Another observation before occupying ourselves with the western rose window of Mantes. With rare exceptions, the principal division of the stone tracery that fills the rose window proceeds from the dodecagon, i.e., that the principal compartments of the stone tracery form 12 angles and 12 rays, as indicated in examples A and C (Fig. 2). In the primitive roses the voids are formed on the axes as in example A, while in t the roses designed since the middle of the 13 th century, the rays are most commonly placed on the axes, as in example C.

Then (Fig. 3) see the drawing of the western rose window of Notre Dame of Mantes. It is still the system of shoring rays that dominates here. The little columns of the external order have their bases turned to the circumference. Those little columns receive arches that at their tops bear the internal order of little columns, whose capitals are likewise turned toward the central eye. That eye must suffer a great pressure and is thicker than the rays, which is reasonable. The iron armature of the glass is not engagedin a rebate at the middle of the thickness of the stone, but is fixed externallw, as i indicated by the section A, and pins also fixed in the stone hold the panels against it. Again according to this system t the rose of the western facade of Notre Dame of Paris is combined. This rose is later than that of Notre Dame and Mantes; it dates from about 1220; its composition is already wiser in

presenting compartments better understood and more graceful in appearance. The problem consists in arranging the compartments so as to leave nearly equal spaces for the glass panels. One sees that in the rose of Mantes the spaces adjoining the circumference are out of measure wide, relatively to the inner spaces. The exterior of the external spaces is supplemented by the iron armature; but the panels maintained by the great iron circles B have too great an area in comparison to t the panels C, and require the addition of numerous rods or secondary bars, that do not offer sufficient resistance to t the pressure of the wind. Further, the weight of the stone tracery is entirely transferred to the two little lower columns, which presents a dander, for the stability of the rose was much compromised. The composition of the rose of Mantes, already very bold for an opening 26.3 ft. diameter, became impossible to execute if this diameter was increased. Now the diameter of the western rose of Notre Dame of Paris is 31.5 ft. The architect claimed to give its stone centre both more strength and greater lightness. Consequently (Fig. 4) he divided the circle into 24 parts for the outer zone and 12 parts for the inner zone. He inverted the little columns, i.e., he placed their bases toward the centre and their capitals next the circumference. He placed on the capitals of the outer zone a strong arcade, thicker than the little columns, and which already forms a complete series of voussoirs, able to maintain itself by its joints like the voussoirs of an arch. Then he reduced the diameter of the centre by more than 3.3 ft. Between the two zones of littel columns, he placed a second strong arcade, that formed a second circle of voussoirs; then the reinforced eye was also cut radially. The little columns were nothing more than struts to make these three circles stable. T They had to suffer but a weak pressure, so that he made them very light. When the problem of a great circular tracery of stone is set, it is difficult to solve it in a happier and w wiser manner.

In this composition, the iron armature required for maintaining.the glass panels no longer had any importance from the point of view of the stability of the system. That armature was set in lead with great care, as well as the pins; for in that rose as in that of Mantes, the glass was placed against

the inner face and not in a groove; so that the tracery had its entire thickness on the exterior. [1]

Note 1.p.45. At the restoration, to avoid the effects of oxidation of the iron on the stone and not to load that stone tracery, the panels of glass were fixed on an independent and internal iron armature. Thus there exists no chance of the d destruction of this beautiful composition.

The best proof that the composition of the western rose of Notre Dame of Paris was perfectly understood, is that this tracery has suffered no important changes. Three little columns have been cracked by the swelling of the anchors of the armature, and two pieces of the arcade were moved by the iron ties set to maintain the organ front. Yet the great tracery has remained in its vertical plane in spite of the weight of the glass, the pressure of the wind, and those iron fastenings attached during the last (18 th) century to the arches, when the great organs were erected. At A is traced the section of this rose. Some details are necessary to cause the worth of this structure to be appreciated. We give at A (Fig. 5) the section through the eye, strengthened by the moulding a, just as one reinforces the hub of a carriage wheel. At B is the s section of one of those inner little columns, whose diameter is 5.5 ins., with the moulding b of the base. At C is a capital of one of the outer columns with base c and its reinforcement. At D is the section of the outer arcade of the section of the outer segment of the circle and connects them. The thickness of those outer and inner arcades is not more than 9.1 ins., and that of the little columns is 7.1 ins., including the reinforcement in which are fixed the pins. There is no rose of the middle ages whose tracery presents smaller sections relative to the diameter of the opening, and none has better resisted the action of time. If we return to Fig. 4, we shall indeed observe, that the jointing is both very simple a and very skilful; the pressures are exerted on the pieces of stone in a manner to avoid all chance of fracture. The little strut-columns, reinforced at their ends by the projection of the bases of the columns, give much stiffness to the entire system, and rest well on the imposts of the heads of the arcades. The eye is thicker than all the rest of the tracery and offers a central resistant point. This tracery is entirely cut

in gypsum of superior quality; the mouldings and the least details have retained all their purity. The sculpture of the c cusps as well as that of the capitals is admirably treated. This tracery was formerly painted and gilded. One still sees on the shafts of the little columns traces of the gold stars that covered them on a ground of blue. When one examines in detail this charming composition, and he takes into account the knowledge and refinement of observation governing its execution, two things are surprising; the so rapid development of this art that had hardly left the Romanesque, yet was so certain of its means and of the effect it desired to produce; also to claim to inform us that these are the laborious expression of a diseased art, foreign, subject to the capricious impudence of an imagination still a little barbaric, without connection with the boldness of the modern spirit. In truth, in an epoch like ours, when architects do not always succeed in maintaining walls of solid stone in their vertical planes, one could show himself more modest and more careful to inquire into the methods of those masters, who knew how to combine a n enormous stone tracery in a manner to remove it from any chance of destruction during six or seven centuries. But how is one to prove the clearness of the sun to those, who are not content with bands over their eyes, and do not freely permit any one to seek the light?

The western rose of the cathedral of Paris, as we have just stated, yields to no other, even in a more recent epoch, in r regard to the volume od the material set in the work compared with the glazed surface, as much as the perforations are of little importance.

There is a certain interest in knowing the volume of stone employed in this tracery, taking each piece as inscribed in the smallest prism, according to the method of all times.

The external arcade	145.2 cu.ft.
The larger little columns of external zone	42.0
The smaller columns of external zone	38.0
The internal arcade	78.2
The little columns of internal zone	22.2
The eye	37.0
Total	362.6 cu.ft.

The area of the rose window being 769.7 sq. ft., the volume

of stone per sq. ft. of surface is only 0.47 cu. ft.

We shall see that this actual lightness was not attained, even at the epoch when architecture sought to appear very delicate.

A little before the construction of the western facade of the cathedral of Paris was erected the abbey church of Braisne, one of the most beautiful churches of Soissonais.[1] That church is now partly destroyed, but retains its transepts and choir. In the gables of those transepts open rose windows of excellent style and remarkable construction, perfectly preserved. We sketch (Fig. 6) one of those roses. Here according to the method adopted at the end of the 12 th century, the little radial columns are placed with bases toward the circumference; but already an outer arcade connects the outer system a at Notre Dame of Paris. The jointing is very simple and presents all guarantees of durability, but this rose is far from having the lightness of that of the cathedral of Paris. Otherwise the system of glazing is the same.

Note 1.p.48. The construction of this edifice was begun by Agnes de Braisne, wife of Robert de Dreux in 1180. (See monographie de S. Yved de Braisne by M. Stanislas Prioux. 1859.

The rose window of the facade of Notre Dame of Paris was cut about 1220, as we stated above. About 40 years later (in 1257) were erected the two south and north gables of that church to lengthen this transverse aisle by some yards.[2] These two gables are pierced by enormous rose windows no less than 42.3 ft. diameter, that open on open galleries. These roses are constructed according to the system indicated in our Fig. 2 at C; i.e., the lower corners within the square circumscribing the ciccle are perforated like the circle itself, while the two upper angles are blind, being masked by the vault. Here (Fig. 7) is the external draweng of one of the two rose windows, t the southern one. The corners A are blind, whice those at B are opened; which was natural, sence this stone lattice rests on the open arcade C, and thus the surface comprised between the bottom of that arcade and the level D only forms an immense window with a height of 60.7 ft. and a width of 42.7 ft. Below the rose the double gallery (see section E), glazed at V, is placed apart under the great stone tracery so as to leave two passages P, P′, one outside and the other inside. The thick-

thickness of this tracery is but 1.54 ft. The side arch of the vault exactly encloses the upper semicircle of the rose window, consequently forming a round arch.

Note 2.p.49. Art. Cathedrale).

Our drawing shows the profound modifications, that in some years were introduced in the composition of those parts of the grand lay architecture of the 12 th century. That art cannot be reproached with immobility, for it is difficult to transform itself more completely, while remaining faithful to the first principles accepted. The tracery becomes complicated a and is divided, and the system that we already find entire in the western rose window of Notre Dame of Paris is extended.

The external arch, that in the rose of 1220 forms squat voussoirs is free, but it exists; radial little columns remain and are arranged with more skill; the eye is smaller; finally the lower courses are perforated to add more area to that colossal sheet of glass. If the composition of this tracery has a pleasing appearance, the knowledge of the constructor is calculated to cause us to reflect. For in this great stone sash the effects of the pressures are calculated with rare skill. At first on glancing at the jointing indicated in our Fig., one will see that the entire upper part of the great centering, that includes the voussoirs of the outer arch G, does not load the tracery, that loads itself only from the section H. That these loads are transferred to the principal radials K, that are shored in all directions; that the jointing is so traced as to avoid fractures in case of movement. That the s sections being always normal to the curves, the pressures are exerted in the direction of the resistances. That the opened corners B, which support a considerable pressure, are combined with a view to resist that fracture in the most efficient way. That the iron armatures intended to maintain the glass panels set in the rebates in the thickness of the tracery, also add to the general system of shoring. [1]

Note 1.p.52. This south rose window of the transept of Notre Dame of Paris, because of a pronounced movement of separation produced in the foundations, in the two buttresses of the gable (the soil at that point being compressible) had suffered such deformations, however without their causing a catastrophe, that cardinal de Noailles at the beginning of the last

(18 th) century undertook to cause this stone tracery to be rebuilt anew. But the sections were so badly combined that the materials were of such mediocre quality, that the work threatened ruin recently, also the lower courses had been rebuilt blind, probably believing that this change would give greater stability to the work, which was a great error, since those courses themselves rest on the tracery, that was loaded with a useless weight. Thus it was necessary several years s since to rebuilt the rose. Happily old fragments still existed, the panels of the primitive glass having been replaced as well as the iron armatures. It was then easy to rebuild that rose in its primitive form (this form was slightly modified, especially in the section of the mouldings). A strong tie was placed from L to M to prevent any spreading; the buttresses were strengthened. The north rose had not been rebuilt, although it was deformed because of the spreading of the buttresses; it sufficed for restoring it to take it down and replace the pieces broken under load and by the spreading. But what emphasizes the resistance of these great stone sashes, when they are well combined, is that they remain entire for centuries, in spite of accidents like those mentioned.

When the engineer Polonceau conceived the system of iron circles to resist the pressures between the floor and arches of a bridge, he really only applied a principle that had already been use six centuries before him. Men justly boasted of the new or renewed system, but no person thought of turning his eyes to the cathedral of Paris and many other edifices of the 13 th century, on which had been employed so frequently a and so successfully circles as a means of resistance opposed to pressures. In the two rose windows of the transepts of Notre Dame of Paris, it was impossible to find a means more efficient for resisting the pressure exerted on the curved sides of those triangles than the stone circle B, itself powerfully shored by the small curvilinear triangles R. The crocket-struts S complete the system of resistances. Do not forget that this enormous circular opening does not rest on a solid wall, but on an open gallery itself of an extreme delicacy; that to not crush the little columns and prisms of that gallery, it was necessary for the rose to exert on these slender points of s support a pressure equally distributed; for if the vertical

points of support of that gallery have a considerable resistance together, they have but a very weak one separately. Then the problem consisted in making the rose a homogeneous framework, resting no more on one point than another. The perforated angles with their great circle B, their curvilinear triangles R and their crockets S, distributed the loads over the lower course T, so that all points in that course were equally loaded. Further, the two tracery walls X and Y of the gallery being apart, decompose the pressures by means of the arcade C, that forms a series of struts replacing the X-braces in carpentry. The proof that the means adopted are good, is that in spite of the unskilful restorations of the last century, and in spite of the displacement of the buttresses, none of the little piers of that gallery were broken. The arcade C itself had suffered very little.[1] To divide the pressures, to make this stone sash a homogeneous surface, the master of the works, Jean of Chelles, first shored his 12 straight principal radials at the middle of their length by arches, themselves counter-shored by the 12 secondary radials m. At this point the tracery expands and is divided, distributing its loads by a series of curves and reversed curves to 24 radials abutting the principal circle, that is doubled. One of these radials rests on the axis of the gallery; the 10 others at right and left of the axis have their pressures decomposed by the angles with their circles and curvilinear triangles. These loads are so well divided and decomposed, that entire members of this rose could be removed without injuring the entirety. It was then correct reasoning that led to the adoption of this tracery with curves and reverse curves. In primitive rose windows, like those of Braisne and of the western facade of the cathedral of Paris, if a radial or member were lacking, the entire system would be compromised; while here the chances of preservation were multiplied, and indeed many of these roses, that have had six centuries of existence, and have suffered notable deformations or mutilations, have still remained entire, just as a great wooden lattice can be partially destroyed without falling to pieces.

Note 1.p.53. The principal piers h are only 7.8 by 14.2 ins. in mean section; the intermediate piers i are only 3.9 by 5.9 ins. They are cut in the gypsum of the hill S. Jacques. When

struck, these piers ring like metal.

There is a different thing in these compositions than the capricious impudence of an imagination still somewhat barbaric; there is profound experience, judicious calculation, extensive knowledge and a very rare intelligence in the application of the requirements of construction of the decorative effect.

We give here the volume of stone employed in this tracery above the level of the open gallery.

Volume of the eye	33.2 cu.ft.
The little inner columns	74.8
The tracery outside them	79.7
The little outer columns	65.0
The little intermediate columns	15.5
The great tracery outside them	192.0
The little cusps	102.0
The impost pieces and the arches	156.0
The intermediate cusps	51.8
The great pieces of the arcades	498.0
The pieces of the enclosure	635.0
The angles	120.0
Total	1923.0 cu.ft.

The area of this rose window being 1539.3 sq. ft., the volume of stone here per sq. ft. is 1.25 cu. ft.; a volume very much greater than that of the western rose window.

It is now necessary for us to examine the sections of the different members of this rose (Fig. 8). The profile with axis A is the section on a b (see Fig. 7) across the principal members of the rose. The profile with axis B is the section of the secondary members c, d. The profile with axis C is the s section of the tertiary members, which are the cusps. The total section E F, comprising the two great principal rounds a, A, is made on o t, the profile being simplified at the extrados as marked at G. Finally the profile e e, e e′ is the section on f g (of the entirety), i. e., the section on the great circle of the angle. The circumference of the rose is then fo formed of the two great principal rounds a, A, and within the great circle of the corner that suffers a strong pressure, t there is an additional strength f e′; the round C of the member forming the cusp receding at c and connected to the great

round by the bevel h h. On the inside the profile is simplified as marked in our sketch at I. Here the iron armature of the glass is no longer set against the interior surface of t the tracery but is set in the groove at V, so as to better ca caulk the glass panels and to prevent the rainwater from penetrating to the interior. At L are traced the capitals and bases of the principal radials, whose great rounds form little columns; the projection of the bases being supported by a cove M on the front, so that the lower bed of this base can fall in the plane of the round i k.

In the two rose windows of the north and south transepts of Notre Dame of Paris, the two upper corners are blind, the side arch of the vault joining the upper part of the circumference of the rose. If the circle is comprised in a square, in a sort of frame enclosed between the side buttresses, the perforated portion or glazed sash is terminated by the arch of the rose inself. Yet from 1240, some masters judged it proper to perforate not only the lower angles, but also the upper angles of the rose. It was at that epoch that was erected the chapel of the castle of S. Germain-en-Laye. [1] That edifice, whose construction is among the most remarkable, belongs as much to the schools of Champagne and of Burgundy as to that of Isle-de-France. The architect could not fail to apply this system of windows to the rose window. This chapel was entirely covered by a coating of plaster, after the works undertaken in the c castle under Louis XIV. The restoration of this edifice having been entrusted to one of our most skilful architects, M. Millet, he soon recognized very quickly the importance of the S. Chapelle of S. Germain-en-Laye; he hastened to remove from it the embellishments, that it had been compelled to suffer, he recovered the lower arcade by establishing the old ground level, and he removed the plaster that masked the rose window. Now that rose is one of the most beautiful known to us, and is inscribed in a square entirely perforated. Its entirety is s sketched at A (Fig. 9), and consists of 12 principal radials, the four corners being perforated and glazed. The architect desired to take in the most possible light, for the angle piers supporting the vaults (see the partial plan B) project beyond the diameter of the rose; the side arch resting on the little columns a, leaves between it and the rose the space b,

of the lintel that connects the pier to the angle of the chapel is skew, as indicated by the dotted line c, so as to separate this rose.

Note 1.p.35. Art. Chapelle, Figs. 4, 4, 6.

To indicate more clearly the drawing of the rose of the S. Chapelle of S. Germain-en-Laye, we give one quarter angle with one of its perfeorated corners at the scale of 1 : 50. One w will note here that again, according to the arrangement of t the first roses, the little columns have the capitals toward the centre. The 12 principal radials are shored by the intermediate circles D, offering considerable resistance. In their turn these intermediate circles are abutted by the arches F and by the little intermediate columns. Four of these little secondary columns are perfectly abutted by the great circles G of the corners, and the eight others abut against the sash as for the principal radials E, four abut in the two axes, and the eight others are maintained by the trefoils H, which in their turn shore the great circles G of the corners. The jointing of this stone tracery is excellent, simple and resistant. At L we give the section of the principal tracery; at M that of the cusps. The exterior of the rose being at V, one will note that the internal profile is flatter than the external profile, so as to mask as little as possible the glass panels by the projection of the mouldings inside, and to produce on the exterior more vivid effects of light and shade. Here the glass and the iron armatures are in a groove and are no longer attached to the internal surface. We again have in this rose an example of the stability of those delicate stone lattices when well combined; for in spite of the plaster, and holes pierced later and numerous mutilations, the rose of S. Germain-en-Laye stands; and when it is necessary to uncover it, many of those pieces could be utilized.

The school of Isle-de-France only renders lighter the sections of the compartments of the roses, without notably modifying the system of their composition. But it is necessary to describe the roses belonging to another school, that sensibly differ from those belonging to the school of Isel-de-France. The examples just presented show, that in the construction of these traceries, the architects employed as much as possible large pieces of stone, thick perforated slabs and shored radials

These entireties thus form a rigid armature offering no elasticity. This system perfectly accorded with the nature of the materials given to that province. But in Champagne was not p possessed the beautiful gypsum of the Paris basin; the limestone materials at command had a relatively small resistance, and could not be quarried in large or long blocks. It was necessary to build in courses or voussoirs. Those stones could not be set on edge like lias or gypsum. Thus the architects of the cathedral of Rheims adopted other methods. They constructed the tracery of rose windows like the tracery of windows by superposition of courses and the enclosure of compartments by wide circles of voussoirs like the arches of vaults. Thus are made the two rose windows of the north and south transepts of that cathedral, which date from about 1230. The rose is no longer covered by a round side arch as at Paris, but is inscribed in a pointed arch, the projection of the transverse arches of the great vault; so that above the proper circle of t the rose remains an open angle (Fig. 2, sketch B). The rose of the western facade of that cathedral was erected later, i. e., about 1250, and was built on the same principle. The principle circle is a thick round arch composed of voussoirs, into which extend the compartments. Those rose windows being perfectly engraved with all their details in the work published by M. Gailhabaud,[1] it seems useless to us to reproduce them here. The principal circles of the transept roses have no less than 5.25 ft. in thickness and form actual arches constructed of voussoirs. As for the internal compartments forming the g glazed sashes, they are only 0.8 ft. thick, not including projections of bases and of capitals of the little columns. The glass panels are attached to the inner surface of the tracery, as on the rose of the western facade of Notre Dame of Paris.

Note 1.p.58. Architecture du Ve au XVIe Siecle etc. Vol. I.

The western rose window of the cathedral of Rheims more nearly approaches the system of Isle-de-France, but the great circle of voussoirs no less exists and is 7.48 ft. thick, which makes it an architectural member of great strength. As for the tracery,its thickness is 2.7 ft. Its glass panels are set in rebates. But we have emphasized elsewhere (Art. Cathedrale) the extraordinary strength employed by the architects of Notre Dame of Rheims. Thus indeed those great traceries,

already so light at Paris at the beginning of the 13 th century, are immovable constructions, are thick and no longer rest on sections of 0.65 to 1.04 sq. ft., but on those of 2.15 to 2.60 sq. ft. Yet from the last years of the 13 th century these architects of Champagne had attained and even surpassed the limit of lightness given to tracery in Isle-de-France. Then the architects knew how to find very fine and resistant materials, for example, such as the lias of Tonnerre, and profiting by the qualities peculiar to those limestones, they gave to the compartments of their windows, to the mullions and and tracery sections, a slenderness never exceeded. In Art. Construction, one can take into account the extraordinary lightness of the members of the tracery of Champagne by examining t the Figs. relating to the church S. Urbain of Troyes, built at the end of the 13 th century. But even at Rheims there existed a church, that we have frequently mentioned, S. Nicaise, built by the architect Libergier, and whose arrangement, construction and details gave it an entirely exceptional value. Of that church, demolished at the beginning of this (18 th) century, there remains to us only the tomb slab of its architect, now deposited in the cathedral; some fragments of paving and ornaments, plans, and a small number of drawings and an admirable engraving. Above a porch very remarkably designed, at the centre of the western facade opens a rose window in composition entirely of Champagne, and that rather forms a vast window than a proper rose windou, placed beneath the side arch of the vault of the nave.

Note 1.p.59. Art Porche.

We presen that composition (Fig. 10). The arch A is the s side arch or rather a first transverse arch of the great vault. The circle enclosing the tracery is indeoendent from that arch, only being connected to it by the five imposts B. According to the custom of Rheims, the tracery is independent from the circle, as shown by the section at C. To maintain that circle were placed the shoring circles D, E, F. One will note that in the drawing of the tracery, the external arch is shored by a series of struts G, that no longer all tend to the centre like the radials of the roses of the first half of the 13 th century, but which have an oblique resistance, and thus even prevent a deformation sometimes produced. Indeed it occurred for

roses of great diameter and with members of weak section, that a deformation was produced as indicated in Fig. 11. If a part of the circumference of these roses suffered too strong a pressure because of settlement or spreading, the eye rotated on i its centre and the radials, instead of tending to that centre, swung at their feet.[2]

Note 2.p.59. The section of the tracery having much depth (see that of the tracery of the south rose of Notre Dame of Paris) and small width, so as to leave more place for the glass, it is evident that if pressure be exerted at one point of the great circle, the radials not being able to shorten t themselves, found a resistance in their depth, and pushed the eye in the direction weakest in their section, causing it to rotate.

The accidents resulting from this movement do not require mention; they compromised the stability of the entire work by causing fractures and taking all its stiffness from the tracery. Certainly it was not in the robust roses of the cathedral of Rheims that such effects could be produced. But Libergier had probably observed this movement of deformation by rotation in the rose windows of Isle-de-France, more delicate t than that of Notre Dame of Rheims; desiring to equal and even surpass that delicacy in the construction of the western rose of S. Nicaise, he adopted a system that must avoid these dangers by the aid of the relieving struts of that rose (Fig. 10), he prevented the rotation of the eye. This was an advance always followed in the composition of roses of the 14 th and 15 th centuries. Thenceforth combined after this principle, those were much less subject to deformation.

The system of the rose window in Champagne, composed of a strong circle of voussoirs, enclosing the internal compartments formed of stones set on edge, had this advantage of presenting a certain elasticity and of allowing the avoiding of partial loads on those compartments. But also these architects of Chamfagne of the end of the 13 th century were very experienced and very skilful constructors; and if unfortunately t the church of S. Nicaise of Rheims no longer is there to prove it, we still possess that of S. Urbain of Troyes, which is c certainly the most marvellous application of the system of Gothic construction.

The 14 th century did not show itself as ingenious in all provinces, yet some masters attempted to prevent the rotation of the radials of roses.

For example, at Amiens the north transept gable of the cathedral about 1325 was pierced by a great rose, whose compartments are generated by a pentagon and no longer tend to the c centre of the circle, bu to the angles of the pentagon forming the eye; this was a means of preventing the swinging of the radials; but that rose is not a happy composition. The end of the 14 th and beginning of the 15 th centuries erected but a very small number of religious edifices in France; the wars and m misfortunes of that epoch produced other cases. It was only after the end of the reign of Charles VII that the architects set themselves to work. In regard to roses, the system of Libergier then seems to have definitely prevailed, and the western rose of the S. Chapelle of the palace at Paris, rebuilt in the 15 th century, is evidently a delayed descendant of th that of S. Nicaise of Rheims. We give one-twelfth of that rose at the scale of 3 : 100.

When one glances at this stone tracery, almost exclusively composed of curved lines, it seems at first sight, that these meshes presenting a most agreeable confusion to us, an unsound conception to others, according to tastes and opinions, were only determined by caprice. It is nothing of the kind. Whether one has for the architecture of that epoch either admiration or has taken the part of blaming it, it is necessary to deal with geometry, to take into account this composition; now geometry cannot pass for a science of of chimerical persons.

In the rose of S. Nicaise, not only are the radials straight, but also the oblique rays that perform the office of oblique struts; but in a suming a stress or pressure on a point of the circumference, these struts would themselves need to be shored to resist that pressure. For example, observing the texture of plants, one notes that the network forming the leaves and the pulp of certain fruits, presents a very resistant cellular system, if one considers the slenderness of the fibres and the softness of those organs. An analogous principle directed the masters in designing the rose windows of the 15 th century. They retained some radials and filled the spaces left between them by actual cellular arches, quite similar to the organs of plants.

Thus is drawn the western rose of the S. Chapelle of Paris. Six straight rays divide it into six great sectors, that are filled by two principal curves shored by the network of secondary curves. The loads or pressures are thus distributed over the entirety of the arches. But it is unnecessary to believe as some affect to state, that those curves are capriciously arranged, for they result from a very rigorous geometrical drawing. The ray a b having been drawn from the eye, the portion of the great ray b c remaining was divided in three equal parts. The line a e is the diameter of a hexagon, on the sides of which were placed the centres f of circular arcs b g. On the side f f′ of the hexagon was placed the centre h of the circular arc g i; from the point h was drawn a line parallel to the great ray a B; taking one-third of the part of the circumference c B, the point j was obtained. From that point j w was drawn a line tangent to the curve g i, which gives the axis on which should meet the curves of the secondary network of the great lobe. On the line A C parallel to the great ray a B was sought the centre K of the circular arc l j; the line l K being parallel to the side of the hexagon. From the point K was drawn a line perpendicular to the axis j D; on that line at n was sought the centre of the circular arc i l. On the same line E m at an equal distance from the axis D j, at o was placed the centre of the arc m j; on the same line at p was sought the centre of the arc m q; on the extension of the same line at v was sought the centre of the arc m B. Thus have been drawn the principal curves of the compartment. An equilateral triangle divided by the axis D j gave the centres of the secondary lobes, as other equilateral triangles in the great upper lobe have given the centres of the secondary of that p part. The sides of those equilateral triangles have given the positions of the points of the cusps intended to consolidate the tracery. Our Fig. shows the positions of those centres on the sides of the equilateral triangles, so that it is unnecessary to furnish more detailed explanations. The profile G gives the section of the principal members and H that of the s secondary members. The sketch L is at a larger scale and shows how those secondary members intersect the principal members. One notes that the eye is externally reinforced by a circle and a projecting cusp, that gives greater thickness and cons-

consequently greater strength, all loads acting on this central circle. The jointing indicated on our Fig. shows how the pieces of stone are cut according to the pressures they have to sustain. All these joints are further cast with lead, as in all roses of some importance after the 13 th century; the lead itself forming the joint pin; while in the roses with r radials in the 13 th and 14 th centuries, the constructors p placed iron pins in the beds, which sometimes caused the stones to split because of oxidation. The rose of the S. Chapelle of Paris was cut in the hard stone from Vernon, and only suffered partial alterations because of a spreading of the two towers forming buttresses. [1]

Note 1.p.64. See Monographie de la S. Chapelle du Palais, by V. Colliot. 1857.

It was impossible to carry lightness further in these combinations of stone tracery designed to maintain the glass. The science of drawing, precision in execution, calculation of pr pressures and resistances, had attained their last limits, an and the roses that were still made at the beginning of the 16 th century are far from fulfilling those conditions in the s same degree.

It is in the provinces of Isle-de-France and of Champagne that the roses are larger and are combined with more knowledge and taste. Yet one cannot pass on silence the beautiful roses of the cathedral of Chartres, which date from the first half of the 13 th century, and are remarkable in style and execution. [2] That of the western facade in particular is a true masterpiece, tha attracted the attention of Villard of Honnecourt, since he gives it in his Album; but that rose has been engraved in several collections with sufficient care and accuracy, so that we do not believe it necessary to reproduce it here. It is recommended by a singularly robust construction and combinations in jointing of rare strength. But the stone employed (limestone of Berchere) does not permit that delicacy in drawing, and those fine perforations of the roses of Isle-de-France and of Champagne.

Note 2.p.64. See Monographie de la cathedrale de Chartres, published by Lassus, under the auspices of the ministry of public instruction.

A very remarkable school of the middle ages, that of Burgundy,

seems to have only accepted with distrust the principle of roses. In that province the roses are small and only appear late. Yet Burgundy possesses materials that lend themselves perfectly to this kind of windows. The first rose windows appear in the little church of Montreal, which dates from the last years of the 12 th century. That opened in the apse is remarkable by the frankness of its structure. We give a quarter of it (Fig. 13). It consists of three zones of little cut slabs 5.1 ins. thick forming three rows of open semicircles chamfered between the joints. To illustrate the cutting of those pieces of stone, we present at A one of the intermediate zone at B and one of those of the inner zone. These slabs are simply set with mortar and form three rows of hollowed voussoirs. The chamfers are continuous inside as indicated at a to better relieve the glass panels set in rebates. The western rose of the same church is composed of a series of rays formed by very pretty li little columns and terminated by a perforated arcade. We also mention the roses of the cathedral of Langres, that in style belong to Burgundy and date from the same epoch (end of 12 th century). Those roses simply consist of great open cusps as voussoirs and are joined inside by an iron circle (Fig. 14). Those roses are of very small dimensions, and cannot be compared to our great roses of Isle-de-France dating from the same epoch, such as those of Braisne, of the cathedrals of Paris, Laon, Soissons, etc.

One can class among roses the eyes 3.3 to 6.6 ft. wide opened in the gables and under the tympanum walls of some edifices in southern France.

The wall of the square apse of the curious church of Royat is pierced by a pretty rose of the 13 th century with 6 lobes and without internal tracery. We give (Fig. 15) the external elevation of that rose at A and the section a B, and it consists of five rows of voussoirs rather awkwardly cut. But the art of the lay school could never be admitted into the southern provinces except as an importation. Men felt the influence of that art and sometimes accepted its forms without understanding its value from the point of view of consthuction.

Two of those eyes from the cathedral of Paris are sketched at C and D, on the contrary emphasize the importance of construction in the composition of these openings of small area.

The rose C is pierced in the top of the gable, and is intended to light the carpentry. Those at D are opened in the lower story of the belfry of the towers. Here the design coincides with the jointing and gives a series of corbels very judiciously combined te make an opening in a surface without having recourse to arches.

In terminating this Article it is necessary to cite the beautiful roses of the middle of the 13 th century in the abbey church of S. Denis; those of the chapel of S. Germer, that very probably reproduce the primitive rose of the S. Chapelle of the palace at Paris; that of the south transept of the cathedral of Seez, skilfully restored by M. Ruprich Robert. Among the roses of the end of the 13 th and beginning of the 14 th centuries, those of the transepts of the cathedral of Clermont, that are perforated with the upper and lower corners, like the rose of the S. Chapelle of S. Germain-en-Laye; [1] those of the transepts of the cathedral of Rouen, charming in style and ex execution.

Note 1.p.68. At the cathedral of Clermont, the square perforated rose windows are placed under a side arch with very flat curve, that produces a very bad effect. But it is not necessary to go to Clermont to study the art of the 13 th century.

Like the English school, the Norman school was very miserly in roses. In the architecture of those countries great windows habitually replaced rose windows in the gable walls of the transepts. One does not see that Rhenish Gothic architecture adopted the great rose windows. For example, at the cathedral of Metz immense windows light the transepts. Rose windows then belong to the lay schools of Isle-de-France and of Champagne, and we see again in the last province, that the r roses are inserted beneath the side arches of the great vaults, and thus can be regarded as true windows.

SACRAIRE. Sacrarium. Sacristy.

A small vaulted room situated near the choirs of churches, where are kept the sacred vessels. In a great number of churches the sacristy serves as the sacrarium; then the sacred vessels were deposited in the sacristy. Yet are mentioned actual sacrariums attached to the choirs of churches in the middle ages. The old cathedral of Carcassonne possesses two sacrariums

at right and left of the sanctuary, (Art. Cathedrale, Fig. 49), that have very low vaults and are furnished with cupboards w with folding doors. These sacrariums date from the 14 th century. We also find them in the cathedral of Chalons-sur-Marne, that date from the 12 th century. Those closets have no external exits and open only into the church by narrow and well i ironed doors. In certain monastic churches the sacrarium, i.e., the place for the sacred vessels, only consisted of a little structure of stone or of wood placed near the altar. That arrangement was formerly observed in the abbey church of Cluny and in that of S. Denis in France. (Art. Choeur, Fig. 2).

SACRISTIE. Sacristy.

A room located near the choir of churches, serving for the preparation for the ceremonies of the worship, permitting the clergy to assume the choir vestments, to enclose the ornaments and the sacred vessels in cupboards for that purpose. During the middle ages the churches were always surrounded by important dependences. Around the monastic church rose the buildings of the community; at one side of the cathedral were the episcopal buildings; in the vicinity of parish churches was t the parsonage and sometimes asylums. Those annexes to churches permitted the establishment in the ground story and on a level with the choir, of halls more or less numerous and vast, which were devoted to religious service. That explains how many of our churches, whose annexed buildings have been demolished, are deprived of the old sacristies.

Ye some cathedrals have retained their sacristies, because they depended on the monument itself. Thus the cathedral of Rouen still possesses its sacristy of the end of the 12 th century, attached to the south side of the choir; that on t the two sides of the transepts of the cathedral of Laon are seen two beautiful sacristies of the beginning of the 13 th century; that the cathedral of Tours possesses a vast sacristy of the 13 th century; that the one at Chartres retains at the north side of the choir a beautiful sacristy of the 14 th centurw. (Art. Cathedrale). Yet those dependances are now rarely sufficient for the needs of the clergy, the bishop's palace or monastic buildings having been demolished or devoted to other purposes. Those sacristies aften open on a cloister, as

at the cathedral of Amiens.

One of the oldest sacristies, whose arrangement has been r retained, is that of the cathedral of Paris, which connects with the episcopal palace. There remain to us very curious drawings of those halls deposited in the archives of the empire, [1] drawings that we have reproduced here (Fig. 1). This sacristy of Notre Dame of Paris consisted o. a two-story building, one lower than the floor of the church, the other about 16.4 ft. above it.

Note 1.p.69. Tracings of those drawings were given to us by M. A. Berty. (Art. Palais, Figs. 7,).

The structures indicated in black on plan A date from the time of Maurice de Sully, i.e., from the end of the 12 th century; those tinted gray were later. At B is the south side a aisle of the choir of the cathedral; at C is a flight of 6 s steps descending to the lower sacristy, and at D is the stairs ascending to the high sacristy, which also served as treasury. But when at the beginning of the 16 th century bishop Etienne de Poncher doubled the great hall by a gallery E, the passage F between the sacristy and the bishop's palace was found to be masked, a passage H was made at the expense of the lower hall. The offices of the bishop were established on the great floor of the great hall G, the tower I serving as a dungeon. The section P is made on the longitudinal axis of the sacristy, and indicates the arrangement of the halls devoted to religious services. On demolishing the sacristy built by Soufflot in the last century, we found the pointed windows K, pierced through the buttresses of the church. From the landing C, one still descended to two little vaulted vestiaries under t the chapels, that in the 13 th century were built between these buttre sses.

Those annexes contemporaneous with Maurice de Sully, builder of the choir of the churlh of Notre Dame, prove that the services of sacristies formerly had not the importance, that they have acquired in our days. Those services consisted of one or two rooms of moderate extent. It is true that around these c cathedral churches existed buildings occupied by the canons, who came through the cloister entirely dressed for the choir. The sacristies of the cathedrals of Troyes, Langres, Amiens, Tours, Chartres, Noyon, Mans, Bayeux, Coutances, Clermont,

Narbonne, and Limoges, that still exist, have not even the extent of the old ones of the cathedral of Paris. These are vaulted rooms occupying one or two bays, and that are confused, so to speak, with the arrangement of the great monument. Yet on the exterior they assume an arrangement less open than that of the chapels; their grated windows are narrower and approach the style adopted for civil edifices. Frequently, as at Notre Dame of Paris, they have a second story, that serves as treasury, archives, library, i.e., for depositing the books of t the choir.

We must not omit here the pretty sacristy, that flanked the S. Chapelle of the palace at Paris, and which was built at the same time. This sacristy had three stories:- the ground story at the level of the lower chapel; the second on the level of the upper or royal chapel; the third was wainscoted and contained precious charters (Art. Palais, Figs. 2, 3). This building was only connected with the S. Chapelle by a little gallery, and thus seemed detached. It was orientated like the S. Chapelle and terminated at the east by an apse with 5 sides. (Art. Chapelle, Figs. 1, 2). This charming edifice, of which we possess only drawings and engravings, was demolished at about the end of the last (18 th) century, to build that gallery, which on the north side conceals the S. Chapelle so disagreeably. At the castle of Vincennes, one still sees a well preserved analogous arrangement. The S. Chapelle of that castle is flanked by two sacrariums and a sacristy with treasury above. (Art. Chapelle, Figs. 8, 9).

SALLE. Hall. Room.

Properly speaking, this word means a relatively vast and c covered area. Thus for a house, the hall is the largest room, where the family assembles and where strangers are received.

During the middle ages that distinction was not made between the parlor and dining room, that is entirely modern. There w was the hall, the common room where they received and dined, then the chambers, wardrobes and closets. There was the the lower hall (ground story) for the men and servants; the upper hall (Second story) for the master and his family.

We have perhaps taken certain habits from the Romans, our conquerors, and it is to be believed that in the second cent-

century of our era, the habitation of a rich Gaul or Gallo-Roman, if one prefers, strongly resembled that of a Roman from Rome. But on penetra ing into the earliest times of the middle ages, one finds but few traces of those purely Roman customs, while he discovers many others with no analogy to them. Now we are permitted to place this dilemma befohe the numerous past and present historians, who cause the influence of Roman customs to prevail over the Gaulish people. Where that influence was not so great as one desires to believe, had not penetrated into the middle and lower classes of the nation, where it had indeed quickly yielded to the customs of the invaders from the northeast in the 4 th century, since the more deeply we plunge into the depths of the middle ages, the more we find usages, that are nowise Roman. In either side of this hypothesis, it must be recognized, either that the Gaulish nation remained faithful to its antiroman customs in spite of the Roman control, or that it hastened to sieze the first opportunity that allowed it to resume the customs dear to it, and that it had never willingly abandoned. It is true that for but a short time have men been devoted to study and write history by l looking beyond political events, that certainly do not have on the nation the influence so long attributed to them. To conquer a people or change its customs are two very different operations, and we see that even in our days, peoples nominally united in a political description, suddenly unveil tendencies, tastes and aptitudes opposed to that political classification.

That archaeological and ethnological studies may have been for something in these modern manifestations is possible, and will even explain the instinctive repulsion of some persons for those studies; but the symptom would not appear if the c cause did not exist. Now in historical researches, the symptoms or the effects, if you prefer, must be indicated with care, under whatever form they present themselves. Then to return to the object that occupies us, we believe that from the Merovingian epoch, the hall assumes a very important part. Those barbarians, those Franks that came from the northwest, who invaded Gaulish soil, built halls or transformed Gallo-Roman edifices, so as to present to all a hall suitable to assemble t their chief vassals, and to organize those Homeric banquets,

that lasted while provisions remained to be consumed. Nothing was similar in the habitations of the Romans. The Roman basilica was a public edifice, a sort of exchange where all kinds of affairs were treated; a place for meeting, and a tribunal where justice was rendered. But the Roman basilica did not n have the personal character of the hall of the Merovingians. The Roman at home received few persons; his life was spent on the public place, in the baths or beneath the porticos. His clients and his freedmen awaited him at the door of his house on the public street. Between the family of the Roman and his clients, however numerous or great personages that they were, there was always an impassible barrier. Now the ancient authors that have described the customs of the Gauls, represent them all to us as loving numerous assemblages, banquets, assemblies, as easily introducing into their houses not only their relatives and men of the clan, but strangers; as pleased to afford lavish hospitality. The barbarous conquerors manifest the same tastes, and the entire Gaulish nation, far from being Romanized in that respect, and from reacting against these customs of those recently arrived, adopted them, or what appears more probable, never ceased to practice them. If for a Frankish chief the hall was the entire habitation, if the Merovingian villas especially consisted of a great building suitable to receive a numerous assemblage, surrounded by some dependances for habitation by serfs and colonists, to shelter the animals and contain provisions; the habitation of the citizen, as far as we can examine it, was equally composed of t the hall in which were received those going and coming, where the family assembled with friends and strangers, where they ate in common, and where business was transacted.

The hall then indeed belonged to the races of the north; o one finds it everywhere that they established themselves, in Brittany, Germany and Gaul. It is then one of the most important programmes in the art of architecture of the middle ages, one of those modified least from the first centuries until t the 17 th; and a singular thing, it is one of the least definite programmes, probably because everyone, from least to greatest, knew what the hall was.

In his Dictionnaire historique d'architecture, M. Quatremere de Quincy thus expresses himself concerning halls:6 "It would

not be possible today to assign in modern architecture (i.e., since antiquity) to the most remarkable halls a general character susceptible of becoming the object, either of a theory or of a practice based on some constant usage."

If we adopt that slightly ambiguous phrase of the celebrated academician, the great halls of palaces and of castles have not been "the object of a practice based on a constant usage." Probably those vast covered areas were due to chance. Yet to conclusions from that force is guided the exclusive mind, if based on knowledge and elevated intelligence.

The middle ages have left us programmes of churches, castles, palaces, monastories, manors and houses, but have left us none for halls; yet in the lack of programmes, monuments exist and allow us to fill that gap, for they are all erected after a general scheme, that strikes those least clear-sighted. We speak of Merovingian and Carlovingian halls only for remembrance; there remain none of those monuments, almost entirely built of wood. We can commence to study halls only in the monuments of the 12 th century. The great hall of the episcopal palace built by Maurice de Sully between the cathedral of Paris and the little arm of the Seine at the south already assumes the characters peculiar to the great halls of the palaces and castles of the middle ages. This building consisted of two stories, one being the ground and the other the second story. (Art. palais, Fig. 7), both vaulted, that of the ground story being on a row of columns, and that of the second a single s span. The ground story contained the offices; the second was the hall of assembly, to which one ascended by a stairs arranged in a rectangular tower. (Art. Sacristie, Fig. 1). The cornice was crenelated on the side next the river and formed a defence. (Art. Palais, Fig. 8).

From the examination of this arrangement adopted in the 12 th century one can already conclude that every great hall of the palace or castle must be composed of ground and second s stories, and indeed we are going to see that the programmes adopted until the 16 th century do not vary much from that first scheme. If the hall of the synod of the bishop of Paris no longer exists except in the old plans and engravings, that of the archbishop of Sens is entire in general and details. I It dates from the reign of S. Louis, from about 1240. The gr-

ground story was built on cellars, is vaulted on a row of columns, and contains the rooms of the officers and the prisons. (Art. Prison, Fig. 1). A carriage entrance passes under the northern end of this hall, and a wide stairs starting from that passage leads to the hall of the second story or hall of the synod, as we see it on the plan (at A, Fig. 1). A stone lobby encloses the entrance of this stairs into the hall. That was in direct communication with the old buildings of the palace by the little door B. The first court of the archbishop's palace is at C, and on that court opens the few windows of t the prison as well as the door permitting entrance to the offices. On the place at the west the facade of the great hall in the second story is lighted by great windows with tracery in the most beautiful style (Art. Fenetre, Figs. 38,39), and on the street D by a great window. On the contrary at the side next the court, the windows are narrow and simple, very high above the pavement of the hall. At G is a fireplace and at K a little screw stairs, that ascends to the upper battlements. The gathered assembly was arranged to face the great southern window, the orator turning his back to it. Thus it was well protected from the north and northeast winds by the wall of the court pierced by narrow and high windows, and it received light from the south and west, softened also by the glass. The archbishop arriving from his apartments entered that part of the hall serving as platform or stage; the audience came in at the rear and seated itself according to the rank of each one. One could open the lower parts of the great windows, either to admit air or to look outside on the place and in the street. This great hall was vaulted. In 1263 the southern tower of the cathedral fell on these vaults and crushed them; men were contented to repair the injury in haste and to cover the hall by carpentry. But when the restorer of this monument was ordered on the advice of the commission of historical monuments, in the repairs made at the end of the 13 th century were found all the members of the vaults, groin arches , bosses, etc. These vaults were recently rebuilt, and the archbishop of Sens as well as the city government were very happy to find thus a magnificent interior, where they could easily assemble 800 to 900 persons, either for assemblages of the clergy, or for distribution of prizes, congresses, banquets, etc.

"The constant use of this hall is then assured for several c centuries, and today each person at Sens agrees in recognizing, that one cannot find a hall better arranged for great assemblages. Fig. 2 shows at A the southern facade of the hall of the synod of Sens on the street, and at B its transverse section at the eastern side. The four angles of the building are crowned by turrets, and the entire eave is crenelated on the court of the archbishop's palace, as on the place and the street. Our Fig. 2 shows the admirable window, that terminates the hall at the south. On the side next the place the buttresses are crowned by very rich pinnacles, varied and surmounted by statues, among which is distinguished that of S. Louis, perhaps the only one of his time now in France. [1]

Note 1.p.75. This hall is now completely restored under the direction of the commission of historical monuments. The building has been divided into several stories by floors, the upper vaults entirely destroyed and those of the ground story in part. Of the six windows at the west, only two have been preserved. Booths built against the buttresses have cut into their bases. The roof was entirely rebuilt, as well as the gutters and coverings. The battlements have been omitted, only two or three merlons remaining. Because of the fall of the tower of the cathedral a spreading manifested itself in the two side walls. This restoration cost 445,000 francs ($89,000). Further, there is nothing uncertain or hypothetical in that work, since for the piers and the upper vaults there exist a great quantity of fragments, that have been preserved as proofs in support of this restoration.

The sculpture of the hall of the synod of Sens may be counted among the best of that epoch. The mouldings and details were evidently treated by a master, and no edifice presents a window better conceived with a grander appearance.

The chateau of Blois still retains the great hall in which was held the states general under Henry III. It dates from t the beginning of the 13 th century, and is composed of two n naves separated by a row of columns. That hall forms an exception; it is situated in the ground story, and has no lower s story according to the general custom; it is covered by two tunnel vaulted ceilings of wood. It is further of very poor construction.[1] It is correct ts state that in the 13 th cent-

century, the castle of Blois was only a residence without great value. Otherwise important was the great hall of Montargis, of which Du Cerceau in "Les plus excellens batimens de F France" has preserved for us very precious plans and details. The great hall of the castle of Montargis fulfils exactly the programme accepted from the 12 th century; a lower hall, a hall in the second story with a grand flight of steps; communications with the habitation of the lord, the keep (Art. Chateau, Fig. 15).

Note 1.p.77. See Archives des monuments historiques, published under the auspices of the House of the emperor.

Here (Fig.3) is the plan of this building in the second story. The ground story was vaulted on a row of columns. A monumental stairway in three flights A [2] started from the court of the castle and rose on arches to the level of the hall in the second story. This interior was one of the grandest in France and was 164.0 ft. long by 52.5 ft. wide inside. The great hall was covered by carpentry ceiled in tunnel form with visible tiebeams and kingposts, the whole richly decorated by paintings. Four fireplaces C warmed the interior in each story, and 6 turrets flanked the building, which dated from the second half of the 13 th century. The lord went to the great hall on a level by the gallery G passing under an arch at H. Further, from the apartments one could enter the hall by the little d door I. On the side B the building dominated a slope planted in gardens, that one could see by placing himself on a sort of balcony [1] located at D. A cross section made on a b (Fig. 4) explains the arrangement of these two superposed halls. At H were covered battlements on the two eave walls of the structure, not covered before the gables. Between the buttresses of the eave walls opened beautiful windows with tracery, wider than those pierced in the gable walls. Five external buttresses kept these vertical. (See plan).

Note 2. p. 77. See Art. Escalier, Fig. 2, that gives the detail of this flight of steps, built or repaired by Charles VIII. On this subject see the text of Du Cerceau.

In the episcopal palaces the two superposed halls had a well known purpose. The lower hall contained the officers; the upper hall was the proper place for great diocesan assemblies, synods, assemblages of the clergy, and banquet halls at need.

Besides the bishops were feudal lords, and as such in many cases they must assemble their vassals. Less explained was the purpose of the two superposed halls in the castles of the lay lords. Yet this arrangement is too general, for it not to be imposed by uniform customs in the entire feudal territory of France. By examining carefully the vicinity of those great h halls, the manner in which their openings are placed and their doors, we can render an account of the uses for which were intended the lower halls, for the purpose of the upper story is perfectly definite.

Note 1.p.78. This balcony is not marked in Du Cerceau's work, but it existed, as indicated by a drawing of the 18 th century in our possession.

When one sees the entire plans of our great feudal castles, ne notes that there were for the garrison only rooms of small extent. That is explained even by the composition of those g garrisons. Very few lords could maintain fifty knights for t the entire year in the 13 th century, like the castellan of Coucy, i.e., five hundred men at arms. Most of those lords d lived on the rent from their tenants, and in ordinary times could only retain near them more than a very limited number of men at arms. If they were at war, their vassals became the g guard of the lord's castle for forty days in the year (an average time). But there were several kinds of vassals, the liegemen that owed personal military service, and the simple vassals who furnished substitutes. From that feudal custom it r resulted that the lord was often compelled to accept the military service of men unknown to him, who made a trade of fighting for whoever paid them, and were accessible to corruption. Further in many cases the liegemen, the simple vassals or their substitutes, would not suffice to defend a lord's castle; then recourse was had to troops of mercenaries, men fighting well for whoever paid them liberally, but uncertain on the w whole. It was then in exceptional cases that the garrisons of castles were numerous; but it must be recognized that from t the 12 th to the 15 th centuries, the defense was so superior to the attack, that a garrison of 50 men, for example, sufficed to defend a castle of moderate extent against a numerous army corps. When a lord appealed to his vassals, and they shut themselves within the castle, the safets men were lodged in

the towers, because each of these formed a separate post commanded by a captain. As for the mercenaries or the substitutes, they were lodged in the lower hall, that was at the same time a dormitory and a dining hall, even a kitchen at need, and a suitable place for exercises. What would indicate that purpose is the internal arrangement of those rooms, their isolation from other services, their small direct communications with the defenses, and the vicinity of vast cellars or storehouses suited to contain provisions, arms, etc.

Those low halls indeed opened on the court of the castle, but only communicated with the defenses by the outside or by posts, etc., by stairs passing within the towers. Thus the lord had less fear from the treason of those soldiers and adventurers, since they could reach the defenses only when ordered and under the oversight of devoted captains. For a stronger reason, the occupants of those lower halls could not penetrate into the keep unless ordered there. From the end of the 13 th century these arrangements already appear, although traced less well than during the 14 th and 15 th centuries. That explains itself. Until the end of the 13 th century the feudal system had still retained the strength of its organization, a although becoming weaker. The lords could surround themselves with a number of safe men, sufficient to be able to defend themselves in their castles; but from the 14 th century, feudal ties tended to relax, and the lords possessing great fiefs were obliged in case of war, to have recourse to mercenary s soldiers. The vassals and liegemen themselves, the sub-vassals, the villages or market towns redeemed in money the personal service owed to the feudal lord; and he that found the advantage in these bargains in time of peace, in case of war saw himself compelled to enroll those bands of adventurers, who from that epoch had no trade then to hire their services, and who became a scourge for the country, if the quarrels between the lords were settled. During the time of calm that allowed France to breathe under Charles V, after the disasters of the middle of the 14 th century, those troops became such a great embarrassment, that the wise king found nothing better than to place them under the command of Du Guesclin, to take them into Spain against Don Pedro.

At the epoch when was erected the great hall of the castle

of Montargis, the feudal state had not reached that grievous extremity of recruiting its defenders among this mass of wanderers, and yet already one sees that the low hall is isolated, having no exits except to the court, and without direct communication wit the defenses. We shall see in the later castles how this arrangement was more clearly emphasized, and what precautions were taken by the feudal lords to keep those troops of mercenaries under constant surveillance.

Before giving examples of these quite particular arrangements, in following the chronological order, we should speak of the great hall of the palace of Paris, built under Philip of France by Enguerrand de Marigny, count of Longueville. Of t that hall, the largest in the kingdom of France there remains today the lower story, some plans and the precious unfinished engraving of Du Cerceau, of which there are but a small number of proofs. That lower story is vaulted on three rows of columns, the piers of the middle row being stronger to support the row in the upper story. We give (Fig. 5) the plan of the second story above the vaulted ground story. At A was the great flight of steps, that from the court of May gave entrance to that hall. At B rose a gallery attached to the south side of the h hall, which communicated to a sort of vestibule C, from which one entered either the great hall or the galleries D, likewise built by Enguerrand de Marigny. Two screw stairs E also connected the lower with the upper gallery. Although the great upper hall had been rebuilt after the fire of 1618 by the architect de Brosse, this arrangement of galleries still existed almost entire in 1777, as proved by two drawings taken from the collection of M. de Monmerque, and which were reproduced in fac-simile by Lassus. Indeed, those drawings executed during the demolition show the door G, the entire work C, the t two tunnels E, the gallery of Enguerrand, and the flight of steps A. By the gallery D one reached on a level the upper porch of the S. Chapelle. [1]

Note 1.p.82. The modern buildings existing today are further erected on the old foundations.

The great hall properly so-called is 231.3 ft. long by 90.2 ft. wide inside. By the door F one entered the gilded hall built under Louis XII; the great chamber of the parlement, where the king held his bed of justice. [2] The screw stairs H

ascended from the ground; those at I only commenced on the se second story to ascend to the roof. Four fireplaces K heated that immense interior. At L was the famous marble table,[3] and at M was a chapel built by Louis XI. Attached to each pier w was a statue of a king of France from Pharamond. We give (Fig. 6) the section of the great hall of the palace made on a b. Great windows opened in the four gable walls, and in the sides were other windows with tracery, but whose sills were raised more or less, according to the height of the adjoining bu buildings, abundantly lighting the two naves with tunnel ceilings with visible tiebeams and kingposts.

Note 2.p.82. In 1550 was opened the door F, as reported by Çorrozet. Antiq. de Paris.

Note 3.p.82. "At the other end of the hall (opposite to that where was the chapel)" says Sauval, "was built a table occupying nearly the entire width, and which further had such l length, width and thickness, that it was held that there never were slabs of marble thicker, wider or longer. It served for two quite contrary uses; during two or three hundred years the clerks of the solicitors had no other theatre for their farces and mummeries; still this was the place where were held the royal feasts, to which were admitted only emperors, kings, princes of the blood, peers of France and their wives, while the other great lords ate at the other tables."

Master Henry Baude, poet of the 15 th century thus describes the surroundings of the marble table of the great hall of the palace:--

"Between the old stag and the great lizard,
Between three courts and beneath two great kings,
At the corner of a gallery that the fifth king sees,
Underneath marble and all enclosed by wood,
Where on meagre days one hears various voices,
Haunts a Barbeau and stays by custom,
Great and well fed, from near Gastinois,
Who lives by crying and feeds on feathers."

(Le Testament de la mule Barbeau).

That "old stag" was a wooden model of a stag, that was made in fine gold for the treasury of the king, which model had b been deposited in the great hall. As for the "great lizard," it was probably a stuffed crocodile deposited in the same place

as an object of curiosity. It appears that the marble table was covered by a wooden stage intended for the "mummeries" of the clerks of the solicitors.

This ceiling, like the piers and the statues of the kings, was painted and gilded. [1] Corrozet [2] has preserved for us the catalogue of the kings, whose statues decorated the isolated or engaged piers.

Note 1.p.84. Sauval. Vol. II. p. 3.

Note 2.p.84. Antiquities de Paris. p. 99.

Supports had been reserved for the successors of Philip the Fair, since the same Corrozet gives us 42 names before that prince, and of 11 kings since, whose statues were placed after the construction of the hall. He further announces that the statues of the kings Francis I, Henry II, Francis II and Charles IX must soon be placed on their vacant supports. There were then places for 57 statues. Indeed we find 55 supports. Louis XI having removed statues of Charlemagne and S. Louis to place them at the sides of the chapel built by him, the number given by Corrozet conforms to the indications of the plan, for one will note that no statues existed at the two angles O, no more than on the mullion of the doorway G. Stone benches were placed at the sides in the recesses formed below the sills of the windows. Our Fig. 6 gives at A a double bay along the walls of the hall, and at B is a bay of the piers of the middle row.

The hall of the palace of Paris was erected according to a programme that nowise concerned the defense of the place. Indeed, when it was built, there was no longer any question of regarding the palace as a fortified castle suited for defense. The palace in the 14 th century was only a residence of the sovereign and the seat of the parlement. Yet the feudal arrangements are still visible here; the low hall retains its secondary arrangement, having only a communication with the courts, while from the upper hall one can pass into the galleries, t the S. Chapelle and the apartments.

But if we glance at the plan of the great hall of the castle of Coucy, the hall rebuilt during the first years of the 15 th century, we see that the programme of the feudal castle is rigorously fulfilled there. The lower hall is nowise in communication with the defenses, while the upper hall gives access

at once to all the great apartments, to the chapel, towers a and defensive fronts (Art. Chateau, Figs. 16, 17).

The same programme is again,fulfilled in a more complete m manner in the castle of Pierrefonds, built at one spurt by t that prince and according to very definite arrangements. At C Coucy Louis of Orleans must retain towers and old curtains as well as the entire system of defense of the beginning of the 13 th century, very well understood and complete. At Pierrefonds he had entire freedom, and this castle rose on methods a accepted at that epoch for a castle, that was both a princely residence, a commodious habitation, and an important place f from the point of view of the defense. Thus the great hall of the castle of Pierrefonds seems to us to summarize the complete programme of those vast structures.

The building that contains the great hall of the castle of Pierrefonds occupies the western side of the parallellogram f forming the perimeter of that feudal residence. This building has four stories; two of these stories are vaulted and form cellars on the side next the court, although they are elevated above the external covered way; the two last give a ground s story on the court and a great hall at the level of the apartments of the second story. At A (Fig. 7) is drawn the plan of the ground story on the court, C is the carriage entrance of the castle with its drawbridge at E. D is the entrance of the postern with its drawbridge at F. On entering the court G one finds in the ground story a first hall H, that is the guardroom, separated from the gate and the postern by a portcullis falling at a. From this guardroom one communicates directly with the portico b, which is separated from the court by a low wall. From the court G one can enter beneath the portico by t the doors c and d. Opposite the door c nearest the entrance is a bench e intended for the sentinel (for then benches were reserved where a sentinel must be posted). Thus it was necessary that each person deserving to penetrate into the lower halls must be recognized. At g is a door giving entrance to a first vestibule I; from this first vestibule one enters a hall K, then the great hall L, that has no exit to the portico except by the lobby h. The stairs l allows one to enter the tower M, to descend into the cellars, and to ascend to the mezzanine portico by passing through the arch n. The double screw

stairs O ascends to the mezzanine fortico, to the great hall of the second story and to the defenses. At p are the firepl-aces; at R the privies, reached either by the guardroom H or the vestibule I. The drawing B gives the plan of the great h hall on the second story. One can ascend there only by the stairs from the guardroom or by the double screw stairs O situated at the end of the portico. The lord entered that hall by the door s communicating with the keep by a series of gall-eries. Entering by that door s, the lord was on the platform elevated three steps above the floor of the great hall. That was the bar, the tribunal of the high justiciar; it was also the place of honor in the ceremonies, such as homagings and investitures; during banquets, assemblies, balls, etc. On that platform rose the fireplace, as in the great hall of the pal-ace of Poitiers (Art. Cheminee, Figs. 9, 10).

One could also from the keep penetrate into the great hall by passing over the gate of the castle into the room situated over the guardroom and the vestibule V. The great hall of the second story was in direct communication with the defenses by the very numerous exits X. In case of attack the garrison co-uld be assembled in this feudal hall, receive instructions, a and instantly scatter over the defensive galleries of the ma-chicolations and into the towers.

The section (Fig. 3) on t u looking toward the entrance mo-re fully explains these arrangements. Below the story A is a story of cellars with floors at the level of the external cov-ered way, B having the level of the ground of the court. In that section one sees how the portico is constructed on a lev-el with the lower hall and has a mezzanine so as to give a v view, and at need surveillance over that lower hall, for the lower portico is glazed at a, while the mezzanine portico is glazed at b. At the level of the floor of the great hall of t the second story, this portico forms a terrace or outer prom-enade on the court. One sees at d the defensive gallery of t the machicolations, which is equally on a level with the great hall.

On the vestibule V (see plan) of this great hall is a gall-ery, that served for placing musicians during banquets or fes-tivals given by the lord. From these arrangements it clearly results, that the lower halls were isolated from the defenses,

while the great upper hall situated on the second story, on t the contrary was in direct and frequent communication with t them; that upper or great hall was on a level with the apartments of the lord, and that the men remained habitually in t the lower hall, separated at need from the functions for which was reserved the upper one. This programme, so clearly written at Pierrefonds, cast new light on the habits of the feudal lords, compelled to receive within their castles garrisons of adventurers.

Perhaps one may object to us, that those arrangements at Pi-Pierrefonds were so ruined, that the restoration may be hypothetical. To that objection we reply:- 1, that the external wall was completely preserved, and consequently the heights of the stories; 2, that the portico was indicated by the thickness of the internal wall and by the fragments of that structure found in the excavations; 3, that the stairs 1 of the plan was preserved, and ascending only to the height of the mezzanine, clearly indicates the height of that mezzanine; 4, that the position of the double stairway was given by the plan preserved; 5, that the fireplaces were still in place, as w well as the division walls; 6, that the arrangement of the guardroom and of its doors are old, as well au those of the room of the privies; 7, that the lobby h (see plans) was indicated by the fragments left in place; 8, that the jambs of the high windows were found in the rubbish and replaced; 9, that the slopes of the roofs are given by the fillets existing on the towers. If then something be hypothetical in this restoration, this could only be details, that have no importance, and of which we make little account, since this does n not concern them.

The great halls had different purposes, according to the t time when they were built. Until the middle of the 13 th century, it does not appear that the building containing the great hall was necessarily divided into upper and lower halls. The feudal lord then lived with his men. Some of these great halls were in the ground story. Thus for example, in the romance of the Vengeance of Raguidel by the troubadour Raoul, we see that a chevalier enters on horseback the hall where the king and his men are eating:- (Old French poem).[1]

Note 1.p.82. Messire Gauvain ou la vengeance de Raguidel, by

the troubadour Raoul, published by C. Hippou. Verse 4199,etc.

In the Roman de la Violette, Gerard mounts on horseback before the hall:- (Old French poem). [2]

Note 2.p.89. Le Roman de la Violette, ou de Gerard de Nevers 13 th century, published by Fr. Michel. Verse 2252 et seq.

Though already at the beginning of the 14 th century the g-great halls were placed in the second story, vast flights of steps permitted one to ascend directly to it. [3] They are not in direct communication with the court as at Paris, Troyes, and Portiers. But about the end of the 14 th century, the great hall of the castle assumes a more private character, aud while retaining its character of a tribunal, place of assembly banquet hall, it is isolated and scarcely communicates with the exterior except by side stairs or galleries. Finally, there are the lower and upper halls.

Note 3.p.89. Art. Perron.

However in France from the Carlovingian epoch is found the trace of the upper hall, then called "solarium" but it does not have the character of the great hall of the castle. It is the hall of the lord, or as we say today, the salon of his a apartment.

These halls were richly decorated in the middle ages:- (Old French poem). [1]

Note 1.p.90. Lis romans de Berte aus grans pies. Chapter 92. (13 th century).

Not only paintings, woodwork, and even tapestries covered their walls, but there were suspended on them arms and trophies collected in campaigns. Sauval [2] relates that the king of England magnificently entertained S. Louis at the Temple on the occasion of the so unfortunate cession by the latter prince, of Perigord, Limousin, Guyenne and Saintonge.

Note 2.p.90. Vol. II. p. 246.

The banquet was given in the grea hall of the Temple. "After the oriental fashion," says Sauval, "the walls of the hall were covered by shields; among others was noted that of Richard I, king of England, named Lionheart. An English lord, seeing the two kings dining together, immediately said to his m master laughingly:- "Sire, why did you invite the French to come to this place to rejoice with you; there is the shield of the magnanimous Richard, that will cause them to eat in

fear and trembling."

We have seen that the hall of the great palace at Paris was decorated by numerous statues and paintings. The great hall of the castle of Coucy was likewise very rich; besides the great carved fireplace, on the walls of that hall were seen colossal statues of nine champions; [3] colored glass filled the windows. At Pierrefonds the great upper hall was likewise decorated by colored glass. The door opening into the vestibule was brilliant with sculptures and surmounted by a window. The vault was a tunnel ceiling, pierced by great dormers on the side next the court. The fireplace that terminated the end opposite the entrance supported on its mantle the statues of the nine chevaliers. The lower hall was itself decorated with a certain luxury, as proved by the fireplace still existing in part, the corbels supporting the beams and the fragments of the portico.

Note 3.p.80. The niches of these statues still exist.

But all the lords were not in a condition to erect buildings as sumptuous. We see in the archbishop's palace of Narbonne, an actual feudal residence, a great hall in the second s story, built by archbishop Pierre de la Jugee about the middle of the 14 th century. [1] That edifice consists of a story w with a row of columns supporting a floor, and of a great hall with ceiling supported by masonry arches. Fig. 9 gives at A t the plan of this great hall, at B its elevation on the exterior of the palace, and at C its cross section. That hall was crenelated on its upper work on the exterior of the court. Walls of great thickness enclosed it between the openings, but the upper story over the great hall was only maintained by t thin walls with little buttresses intended to abut the division walls, that supported the purlins of the roof, thus forming a series of rooms lighted by little windows. This is one of the rare examples of a great hall surmounted by lodgings.

Note 1.p.81. Art Palais, Figs. 11, 12, 13.

The great hall is then the most important part of the castles and palaces; for the feudal lord it is the sign of his j jurisdiction, the place where homage is rendered, where the vassals gather and the defenders assemble in case of siege, where pleas are heard, banquets are given, ballets and masquerades, festivals of every sort. There is no feudal castle or

even manor house, that does not have its great hall. The citizen of the city in his house also possesses his hall in which he gathers his family and friends, where he takes his meals and receives men to treat of business. When the cities can erect city halls, it is unnecessary to state, that these buildings contain the hall of the commune. The programme is the same for the little and the great.

This tradition was retained very late in the castles, even when those residences no longer had the character of strong places. Thus at Fontainebleau the gallery of Henry II is a tradition of the great hall of the feudal castle. That beautiful gallery, like many halls of feudal castles, gives entrance to the gallery of the chapel. At S. Germain-en-Laye one still sees the vaulted great hall that occupies an entire side of the buildings. Even at Versailles, the marble gallery is only the tradition of the great hall of the feudal residences.

The monasteries also possessed buildings that took the name of halls. This does not concern here the refectories, dormitories and libraries, that were actual halls by their construction if not by their purposes, but halls suitable for assembling the religious to treat of affairs of the monastery. Those are the chapter halls. Those rooms, more or less large according to the extent of the monastery, had a special character. The chapter halls are rarely oblong, that form not lending itself to discussions, but are rather square, at least on French soil, for in England exist chapter halls on circular or polygonal plans, with a pier at the centre to receive the imposts of the arches of the vaults. The chapter halls of the French monasteries open on the cloister, generally near the church. It will suffice for us, not to give this Article greater extent than is proper, to present a very complete example of one of those chapter halls dependent on the abbey of Fontfroide near Narbonne. This monastery is almost entirely preserved. On the eastern side of the cloister opens a pretty chapter hall with vaults resting on 4 columns of white marble. (See plan, Fig. 10). On three sides are stone benches raised on a step also of stone and extend along the walls of the hall, that receives light by the portico of the cloister and by three round-arched windows. This structure dates from the end of the 12 th century and is in a charming style, in spite of its extreme simp-

simplicity. Fig. 11 gives its longitudinal section. Paintings formerly decorated the vaults. From the portico of the cloister nothing prevents seeing what passed in the chapter hall. Thus at need could be called the serving brothers of the monks, who having no voice in the deliberations, were no less in certain circumstances admitted to the arsembly in order to r respond concerning facts of internal order and discipline. F From the chapter hall the brothers could go directly to the church by a door opened at the end of the portico (see sect).

Villard of Honnecourt in his Album [1] gives a plan that appears indeed as that of a chapter hall. That plan was drawn by him only to indicate hou one could vault a square hall of great width by the aid of a single central column. "By this drawing," the author writes beneath his sketch,"one combines the capitals of eight columns corresponding to a single one, without any obstacle; it is good masonry." Here (Fig. 12) is the plan of Villard. At the crown c of the four diagonal arches a b abut the secondary arches d c; the branches d e are equal to the branches e f. Side arches are placed over the arches of the windows. Thus the crowns of the fillings are placed according to the lines c h, ce, l i, g e. This construction of a vault is very simple, so that it has been fsequently employed, [1] notably in the side aisles of Notre Dame of Paris, at Noyon and Braisne. All the crowns are set at the same level, and the thrusts are well opposed. A hall built on this plan and lighted on four sides, with only a point of support at the centre, lends itself perfectly to the chapter service of a monastery. It is the system of the English chapter halls re reduced to a square form.

Note 1.p.95. In the notes of Lassus as arranged by M. Darcel, this drawing of vaults has been complicated by the addition of useless arches, and that are also not indicated on Villard's sketch.

SANCTUAIRE. Sanctuary.

A part of a chauch where is placed the principal altar. The sanctuaries of churches of the middle ages are orientated so that the priest at the altar sees the rising of the sun at t the equinox; at least that custom appears to have been established after the 8 th century in the West.

Yet there are some exceptions to that rule. The sanctuary of the abbey church of S. Victor at Paris was turned toward t the east in summer. [2]

Note 2.p.95. Diocese de Paris, by abbe Lebeuf. Vol. II,p.543

Most Rhenish churches have two sanctuaries, one at the east and the other at the west, and the plan of the church of the abbey of S. Gall, attributed to the abbot Eginhard living in the time of Charlemagne, [3] presents the same arrangement. However, in that plan of a church the eastery sanctuary alone is provided with stalls and ambos, that are lacking in the western sanctuary.

Note 3.p.95. See Mabillon and the Architecture monastique of M. Albert Lenoir. p.24.

The adoption of double sanctuaries is found in some French churches, in the cathedrals of Besancon, Verdun and even Nevers. (Art. Cathedrale).

In abbey churches the sanctuary is most frequently installed, either in the transept aisle or in the last bays of the nave. Thus was arranged the sanctuary of the abbey church of S. Denis (Art. Choeur). [4] The sanctuaries of the abbey churches are generally found over a crypt in which were usually placed the shrines of the sacred bodies (Art. Architecture Monastique). These crypts or "confessions." with the sanctuaries above them are still preserved in the abbey churches of S. Germain of A Auxerre, Vezelay, S. Radegonde at Poitiers, S. Denis in France, S. Benoit-sur-Loire, Montmajour near Arles, S. Sernin of Toulouse, etc. Thus the sanctuary properly so-called is raised several steps above the pavement of the nave, and forms a reserved place possessing a special altar, called the altar of relics, while the principal altar was placed below that sanctuary before the choir of the religious, and was called the morning altar, i.e., before which was chanted matins.

Note 4.p.95. For the old arrangement of the sanctuary of the abbey church of S. Denis, see the Cosmographie universelle. Francois of Belle-Foret. 1575. Vol. II of tome I, of D. Doublet.

Our French cathedrals were rebuilt during the second half of the 12 th century or at the beginning of the 13 th century, and properly speaking, did not possess a sanctuary, but only a choir at the middle of which rose the altar. The "cathedra" or episcopal throne was placed at the back of the choir behind

the altar. It is necessary to return to the time when those g great monuments were erected, to appreciate the motives that caused the adoption of this arrangement, that belonged to the provinces dependent on the royal domain. We have indicated t these motives in our Article Cathedrale, and we do not think it necessary to dwell on them. It suffices to say that those great churches were so little provided with what are called sanctuaries in the abbey churches, that the choir was generally on a level with the side aisles.

That arrangement originally existed at Notre Dame of Paris, in the cathedrals of Senlis, Meaux, Chartres and Sens. The choir was not even separated from the side aisles by enclosures, these having been established later at about the middle of the 13 th century, at the moment when those great monuments lost their twofold civil and religious purpose to retain only the latter. Even then the choir was closed, but there was established no distant separation between it and the sanctuary, or rather the altar was placed at the eastern extremity of the choir, at the centre of the apse. Every sanctuary implies the presence of a confession, of a crypt containing one or several sacred bodies; but the great cathedrals rebuilt in the 12 th and 13 th centuries, with rare exceptions,[1] possessed no crypts and consequently no sanctuaries.

Note 1.p.98. Bourges, Chartres.

SCULPTURE. Sculpture. Statuary.

We shall include in this Article statuary and ornamental s sculpture. It would indeed be difficult in the architecture of t the middle ages as well as in that of antiquity, to separate these two branches of the same trunk, and if in modern times statuary sculptors are isolated and have most frequently practised their art in the studio, taking into account neither or ornamentation nor architecture, this is a custom that only d dates from the 17 th century, born within the academies. Formerly statuary sculptors were only image-makers. This title appearing meagre, it was changed. Those image-makers worked for a monument, on the yards of that monument, directly cooperating with the work and under the direction of the master; but also their works (may we be permitted the expression) were immovable in destination. The establishment of academies could

not tolerate such servitude; the image-makers became statuarries, claimed to work at home and to listen only to their own inspiration; thus they were able to produce masterpieces at their ease, but masterpieces of furnishing equipment, that w were purchased, were placed somewhat by chance, just as one buys a precious object and places it in an apartment. During some years however, it was sought to give the statuary a fixed destination, and men were tempted to return to the ancient errors; some statuaries were called to work by the task, i.e., to execute on the monument itself the sculptured parts, according to a general and decided system. But in spite of those attempts, whose value we appreciate, the custom of working in the studio was so deeply rooted, that those sculptures most frequently seemed digressions, ornamental accessories applied afterwards, having no relation of scale to the architecture, in style or character. We do not have to estimate the greater or lesser value of modern sculpture. We only have first to estimate the greater or lesser value of modern sculpture. We only have first to establish this distinction between the works of antiquity, of the middle ages and of modern times, viz./--that in the art of the middle ages, sculpture was not separated from architecture; that statuary and ornamental sculpture are so intimately connected, that one cannot write the history of one without that of the other.

This history of the sculpture of the middle ages requires in order to be understood, that we cast a rapid glance on the works of antiquity, which influenced western art from the 11 th century, sometimes directly, sometimes by devious ways, v very singular and generally little known.

Sculpture in antiquity proceeds from two different principles, that form two principal divisions. These are the hieratic sculpture that takes as a starting point the imitation of nature, and tends to perfect itself in that way, and without s stopping a day after having reached its climax, gradually descends to realism to arrive at decadence. Oriental peoples of India, Asia Minor, even of Egypt, practised sculpture only f from the point of view of the preservation of certain consecrated types. Greece alone escaped from that enervating principle, started from the types adopted in these earlier civilizations, to bring them by more certain and exact observation

of nature, by a sequence of progress, either in choice or in execution, to the absolutely beautiful. But even that they always marched forward, the Greeks could establish neither the hieratism, of the beautiful according to nature, nor t that of the conventional, from which they started. After ascending they descended. Ye in descending they scattered along the route the germs, that must become fruitful. Indeed this established the superiority of progress over the absolute respect of tradition, over hieratism. Had it not been thus, one might claim that hieratism, assuming that it attains at first the very high point as in Egypt, is superior to progress, since it maintains the art the longest possible at that climax, while the progressive course attains perfection for a day, to at once descend the slope opposite to that of the ascent. Hieratic art is sterile. Its products become paler daily, starting from the point of departure to lose themselves gradually in a common trade, from which later civilizations can derive nothing. It is impossible not to be struck by astonishment a and admiration before the sculptures of the Egyptian dynasties It seems that this art, so complete and elevated, whose execution is so marvellous, must furnish to the artists of all time a solid point of support. Yet that is nothing; this admiration can lead to imitations, not to new creations. However beautifu this art may be, it is immediately formulated as a dogma; one can neither omit nor add anything; it is a block of porphyry. Greek art is progressist (permit us the word), and on the contrary is a ductile metal, from which one can continually draw new products. Why have certain civilizations produced fixed arts, so to speak, in a narrow hieratism? Why have others caused to intervene in the productions of art, human reason, mobile passions, the feelings, philosophy, the need of search f for the better?

That would be difficult to explain in a few lines, and we r recognize that the subject is delicate to treat. Yet there is one remark, that we believe should be made here in a summary way, because it will later aid us in explaining the singular evolutions of the art of sculpture during the middle ages. B Besides, as we cannot admit in these matters, no more than in any other, the intervention of chance, since we see the effect and the cause must exist. What is it? We believe it is found

of nature, by a sequence of progress, either in choice or in execution, to the absolutely beautiful. But even that they always marched forward, the Greeks could establish neither the hieratism, of the beautiful according to nature, nor t that of the conventional, from which they started. After ascending they descended. Ye in descending they scattered along the route the germs, that must become fruitful. Indeed this established the superiority of progress over the absolute respect of tradition, over hieratism. Had it not been thus, one might claim that hieratism, assuming that it attains at first the very high point as in Egypt, is superior to progress, since it maintains the art the longest possible at that climax, while the progressive course attains perfection for a day, to at once descend the slope opposite to that of the ascent. Hieratic art is sterile. Its products become paler daily, starting from the point of departure to lose themselves gradually in a common trade, from which later civilizations can derive nothing. It is impossible not to be struck by astonishment a and admiration before the sculptures of the Egyptian dynasties It seems that this art, so complete and elevated, whose execution is so marvellous, must furnish to the artists of all time a solid point of support. Yet that is nothing; this admiration can lead to imitations, not to new creations. However beautifu this art may be, it is immediately formulated as a dogma; one can neither omit nor add anything; it is a block of porphyry. Greek art is progressist (permit us the word), and on the contrary is a ductile metal, from which one can continually draw new products. Why have certain civilizations produced fixed arts, so to speak, in a narrow hieratism? Why have others caused to intervene in the productions of art, human reason, mobile passions, the feelings, philosophy, the need of search f for the better?

That would be difficult to explain in a few lines, and we r recognize that the subject is delicate to treat. Yet there is one remark, that we believe should be made here in a summary way, because it will later aid us in explaining the singular evolutions of the art of sculpture during the middle ages. B Besides, as we cannot admit in these matters, no more than in any other, the intervention of chance, since we see the effect and the cause must exist. What is it? We believe it is found

in the aptitudes peculiar to certain races. We state first t that every outburst of art -- and sculpture is here in the f first line -- is produced in history only by the contact of two different races. It seems that art is never but the result of intellectual fermentation of natures provided with different aptitudes. Let us then at first examine under what influences are developed the arts.

All men, or rather all human races are not equally brought to the need of examining the understanding. For some it suffices to believe and to erect beliefs into a system; for others beliefs never exceed a sort of rule of conduct, and are not struggling with aspirations toward the unknown. Philosophy belongs to those privileged races that examine, analyze and wish to understand in order to believe; to them also belong art, s such as we understand it in the West. But a singular phenomenon! Each of the three great races that divide among themselves the terrestrial globe, if isolated, is not qualified to p produce what is termed the arts. The Aryan race, the white r race in particular, possesses warlike instincts; it produces heros; dominates and governs; it establishes the first religions and regulates their worship; it scorns manual labor and forms societies of shepherds and warriors, with the patriarchate as the principle of all government. Another, the yellow r race, perhaps the most numerous on our planet, is industrious, devotes itself to commerce, to calculation, agriculture and manual labor; it is skilful in fashioning metals; it readily lends itself to every labor, provided that it sees at the end a purely material comfort; without elevated aspirations on a philosophical basis, caring little for the unknown, it remains stationary from the day, when it has erected a tolerable social order by its labor and industry. The third or the black race is ardent and violent, recognizing no power other than material force, superstitious, guided by its physical needs or its mobile and unbridled imagination. None of these three principal races could have produced an art, if entirely separated. The pure white races do not know how to lend themselves to what requires material cares, studies and labors; the yellow races can rise only to the height of a trade. As for the blacks, without that regulation that never abandons the mind of the whites, he allows his imagination to wander so far as to

conceive and produce monsters in everything. He is adroit, s subtle, ingenious, but too whimsical to be an artist, as we have understood it from antiquity; for no art is without laws and principles. The black admits the intervention of law only in the physical order; for him the law is the material force, but his mind admits none of the domain of matters of the mind. Now if the white and the black (the last in a minimum proportion) are combined, art develops rapidly and in the sense of continued progress. In the mixture of white and yellow elements, art also appears but tends to hieratism.

We only pretend to show here certain grand divisions easily appreciated; for in the organism of this world, things are s not so simple and distinct; thus for example, philology has demonstrated in the most evident manner that the so-called S Semetic races are not Aryans, that they belong to another group; they still less approach the yellow or black races, but still tend to the latter in one point by the vivacity and mobility of their imagination. No more than the white or the b black is the Semite an artist by himself, or if he becomes such by the contact of a relatively slight mixture of white, it is in the absolute hieratic sense.

On the contrary, if a considerable Aryan nucleus finds itself in contact with a Semetic people, the intellectual ferment that results produces a splendid development of art, and in the sense of research and progress, Greek civilization is the most evident demonstration of this.

Men will not fail here to accuse us of materialism. But what can we do? For a long time have we been led with empty phrases, when it is a question of discussing the arts or of defining their qualities, so that the desire has seized us to treat that faculty of the human soul with the aid of analysis and reason.

That has been well done for philosophy, and we do not see why it is not done with regard to the arts. When you tell me that statuaries are docile to the breath of inspiration, being unable to believe that Minerva protects them, if you do not state from what inspiration proceeds, we shall advance little. By adding that such a statue is filled with religious feeling, if we do not explain how a religious feeling is translated into stone or marble, your remark matters little to us, the more

that many very religious persons make statues leading to ridicule, and that tolerably sceptical artists make those which make you kneel. Perugino, the painter of religious subjects in particular, and who i so affecting sometimes,"had little religion and did not wish to believe in the immortality of the soul". At least Vasari says so. Then one will not seek in this Article on Sculpture the baggage of phrases stereotyped for the use of most critics in the matter of art, that we shall beware of traducing, but which in merely forming a part of our impressions can interest us, but can cause us to advance a step in the knowledge of the psychological phenomena more or less favorable to the development of art.

It is necessary to seek now perhaps the most elevated art, that of the statuary is born or reborn within a social medium, where it goes to find its elements, or it is a spontaneous de development; how it develops and advances, and how it declines. We have spoken of hieratism and progress, of the search for the ideal. The farther we ascend the current of the arts of ancient Egypt, the nearer we find the arts to perfection, and notably statues. The last discoveries made by the indefatigable M. Mariette have brought to light statues of the epoch of the shepherds, which not only excel in execution the ancient figures of Thebes, but possess a very pronounced individual character. In those distant times, the art had reached a great elevation. That could not be by hieratism, but on the contrary by human effort, a series of studies and advances. Hieratism was only established at the moment when the art had attained great perfection. We see the same phenomenon produced among the peoples of Asia. Art rises (we know no by what series of efforts)to a superior point, and having reached that, men pretend to fix it henceforth. Those were fixed arts met by t the Greeks when they occupied Hellas; they took them in that fixed state, but so to speak, made them leave their chrysalis to push them with ardor and unknown rapidity toward an ideal, which took for its support the attentive and passionate study of nature. Assume for the instant, that those few tribes of Aryans had not lome to establesh themselves on the soil of v Macedonia, Attica aud the Pelopennessus; the arts of those peoples of Asia Minor and of Egypt, shut within their hieratism, would have weakened daily under the weight of that hier-

hieratism itself, losing themselves in a negation. The sphynx and the cherubimwould have remained for future generations t the true symbol of those arts, i.e., an enigma. By shaking off that immobility, the Greeks allow us to assume efforts that preceded. Indeed, the first Aryan infusions in Asia and Egypt in contrast with the aboriginal races found themselves in conditions favorable to the development of the arts and they had rapidly attained an extraordinary superiority; but the Semetic element dominating more and more, these arts were stopped in their advance, just as certain liquids are fixed by the addition of a chemical agent in a certain proportion.

This may pass for a hypothesis; but wha is no one, is the movement, that the Greeks knew how to impress on their arts. They took the hieratic forms of Asia Minor; we see that they gradually naturalized them; they proceed for the arts as in mythology. From Asian myths they make heros and personages; m man and the individual are substituted for the caste; the modern spirit appears, in brief. The divinity or its emanations are personified, no longer by a sort of superposition of attribtes as among the Asians, but by qualities or human passions. At the same time, philosophy frees itself from the human brain, until then buried in dogmatism. For note this well, t that art, but art freed from hieratism, art in search for the ideal, the true principle, always proceeds side by side with philosophy, When the latter boldly advances in the investigation of human problems, art develops with energy and its products are marvellous; when philosophy is panting, tossed about in the midst of opposed systems, and casts itself into scholasticism, as if to fix itself on some points, art in its turn formulates itself, and reaches by another slope that hieratism, from which it had known so well how to free itself. Greek art is free and progressive, its eyes fixed on a sublime ideal, that it restlessly seeks and under Pericles lives beside Plato.

Parallel to the school of Alexandria, Greek art fell into a sort of dull formulas without escape. With Christianity we see it entirely abandon statuary, as if it confessed that it had been abuse,, and that its investigations had only led to the most ordinary realism.

Thus one can prove the influence of these general laws.

With theocracy is hieratism in art, and especially in statuary. With the developments of metaphysical ideas, the study of philosophy, the search for an ideal in art by taking as basis t the careful examination of nature, the resulting progress, b but also errors and falls.

Ought one to conclude from the preceding observations relating to the contact of the different races, that to obtain a Phidias it is proper to place in intellectual relations several Aryans and a Semite in a certain latitude? That the arts are formed like cheimcal compounds, according to a formula w with a little heat or an electric current? No; but in the historical study of the arts, as in that of philosophy, of the movements of the human mind, -- and the arts are nothing but an intellectual flowering, -- it is necessary to know well a and to determine the conditions favorable to that blossoming, and consequently to point out the currents, their mixtures and the successive products of those combinations.

Perhaps one is too little accustomed to treat questions of art according to what is termed feeling; an influence is mobile as fashion, fugitive, and that has the great inconvenience of diverting the artist from the search for causes, of origins, for the philosophical idea in which art is only a trade or t the use of a recipe.

Feeling, admitting that it must be counted with, needs a p point of support; where will this be found, if not in analysis, reasoning, observation and knowledge; judge art matters by our feelings, if you will, bu let us elevate our feeling, or rather our faculty of feeling, to the height of science, if we claim to make our judgments accepted by the impartial public. Besides, is it not somewhat with feeling as with faith, which accepts but does not create. To human reason alone is reserved the faculty of creating; reason leads to art by research and selection, from which results the definition and the knowledge of the beautiful and the good; reason leads to philosophy by the same procedures. Men have never formed a tolerable philosophy with what we call feeling. The Greeks knew a little of it, but never believed that feeling alone c could guide, either in the practice of the arts, or in the ju judgments placed on their productions. "All things were mixed together; the mind separated and arranged them," says Anaxag-

Anaxagoras. [1] If faith and feeling produce miracles, it is not in that fashion. Perhaps the faith that moves mountains, but neither knows nor inquires of what mountains are made, n nor why they are mountains. If it knew this, it would not displace them.

Note 1.p.102. Beginning of a book.(Diog. Laert etc.).

In the arts, what is feeling in things without the knowledge of things?

It would only be to wander from our subject to enlarge longer on those influences, that directed the arts of antiquity, either in the hieratic path, or in the search for the better. It suffices us to indicate some of those currents, before presenting the picture of the art of statuary during the middle ages, a representation scarcely seen, although it develops d daily before our eyes.

What sculpture became under the empire and in Gaul everyone knows. Of the antique types perfected by the Greeks, scattered over the entire western continent of Europe by the Romans, reproduced by a people of artists that did not rise above the common workmen, there remains to us numerous fragments. Leaving aside the archaeological interest attached to those remains regarded as works of art, they only cause weariness and d deep disquiet. No appearance of individuality or of originality; the authors of these monotonous works labor at a task without earning their wages. Reproducing models already copied, never resorting to the vivifying source of nature, carrying their patterns everywhere, from Marseilles to Coutances and L Lyons to Bordeaux, they covered Gaul, Romanized by monuments all covered by the same vulgar ornamentation, the same soft a and coarsely executed reliefs, like those organ players of o our days, that wish to carry opera airs even into our smallest villages.

Sculpture in Gaul at the moment of the great invasions, i.e. in the 4 th century, was no longer an art but a trade, deteriorating daily. From the point of view of execution alone, no nothing is more flat, vulgar and careless. But in composition as in invention, one still finds in those fragments a sort of freedom and originality, that no longer exists in the dreary monuments erected in Italy from Constantine until the fall of the western empire. The Gaulish mind accepted something pecu-

peculiar in that heavy and vulgar sculpture without character, and sometimes frees itself from the Roman classicism in its f full decadence. Thus for example, it does not restriot itself to identical reproductions of the same model for the capitals of an order belonging to an edifice. The shafts of the columns are covered by various ornaments. The types adopted from the orders are modified; there is a sort of attempt at freedom. This is not the occasion for us to enlarge on the value of t those symptoms, which altogether are not considerable, yet we should mention them, because they show that Gaul remained not absolutely under the narrow influence of the tradition of Roman arts. Fragments exist at Autun, Mont-Dore, Auxerre, Lyons, Rheims, Dijon, in Soissonais, that date from the 3 rd, 4 th and 5 th centuries and indicate these original tendencies. H Here is one of those fragments among others, a capital (Fig. 1) from the portico enclosing the temple of Champlieu near Compeigne, that presents a particular arrangement, and that one will not find in Italian edifices of the same epoch (3 rd century). Now the other capitals belonging to the same temple are not cut on the same model. This variation is remarkable in a time when sculpture was only the work of very rude workmen. It allows one to suppose that the Romanized Gauls of the late time were weary of those degenerate reproductions of the same types, and that they sought to abandon them.

That tendency, -- admitting it to be general on the soil of Gaul, -- was lost in the flood of the invasions. The art of sculpture wau extinguished by the conquerors from the north, and if in the rare edifices that remain to us from the Merovingian epoch, one meets here and there some fragments of sculpture, they are torn from Gallo-Roman monuments. Under the Carlovingians attempts are made to renew the broken chain of the arts, but those attempts scarcely end in pale copies of t the types of Roman antiquity, under a more or less pronounced Byzantine influencea Charlemagne could think of nothing else in art, than to stir the ashes of the Roman empire to find t there some sparks; he attempted a renaissance of forms and of the forgotten practical means. Similar attempts only end in rude imitations. The arts are not restored by laws, institutions or regulations; other elements are required to make them alive and cause them to permeate a nation. Now under the Car-

Carlovingians, the hour of the true renaissance of the arts had not sounded. The ferments brought by the conquering peoples for too brief a time were mingled with the old Gallo-Roman civilization for an art like sculpture to blossom.

It is indeed only at the end of the 11 th centurw that one sees appear the first embryos of that art of French sculpture, that a hundred years later must rise to such a great height. Then at the end of the 11 th century the only provinces of Gaul that had retained traditions of the art of antiquity were those, whose Roman municipal organization was maintained. Some cities of the South at that epoch still governed themselves within thheir walls as under the empire; hence they possessed their bodies of artisans and of traditions of antique arts, very much weakened it is true, but still living. Of all the old Gallo-Roman cities, Toulouse was perhaps that which had best retained its municipal organization. In it the arts had not suffered a complete void but were continued. Thus from the beginning of the 12 th century that city became the centre of a powerful school, whose influence extended over a vast territory.

In another region of France the order of Cluny, instituted at the beginning of the 10 th century, had taken a prodigious development at the middle of the 11 th.[1]

Note 1.p.105. Art. Architecture Monostique).

At that epoch the Cluniacs were in relations with Spain, Italy, Germany, England and Hungary; not only did they possess houses in those countries, but also they maintained relations with the East. In the bosom of those Cluniac establishments we can prove an actual art movement about the second half of the 11 th century. Until then on the soil of Gaul and from t the fall of the empire, sculpture was no more; but it suddenly appears as an art already complete, possessing its principles, means of execution and style. An art does not grow like mushrooms; it is alwaws the result of labor more or less long, and it possesses a genealogy. This genealogy it is proper to first investigate.

In 1098 and among the Christians commanded by Godfrey, count Baldwin, Bohemond, Tancred, Raymond de S. Gilles and many other chiefs, took possession of Antioch, and from that epoch until 1268 that city remained in the power of western men.

Antioch was like the heart of the crusades; a prelude of that period of conquests and reverses, it was also their last bulwark. It was in the cities of Syria, far more than in the imperial city of Constantinople, that Greek arts had taken refuge. At the moment of the arrival of the crusaders, Antioch was still an opulent and industrious city, possessing numerous remains of the epoch of its splendor. Entirely surrounded by Grecian cities abandoned after the invasions of Islam but still standing, cities in which one ye finds all the elements of our Roman architecture, Antioch became a base of operations for the western men, but also a commercial centre, the principal point of assembly of the religious sent by the monastic establishments of France, when the Christians held Syria. Besides with the first crusaders had left the West at the call of Peter the Hermit, not only warriors, but men of all sorts, workmen, merchants and adventurers, who soon with that facility by which the French chiefly imitated the new things, that attracted their attention, they fashioned for themselves from the arts and trades practised in the rich cities of the East. Indeed dating from those first years of the 12 th century, th that we see the art of sculpture transformed on the soil of France, but with variations that it is necessary to indicate. The Greek monuments of the 6 th and 7 th centuries which filled the cities of Syria, and notably of ancient Cilicia, possess sculptured ornamention in a beautiful style, which recalls that of the best time of ancient Greece,[1] but absolutely without statuary. Yet there had been at Constantinople before and after the riots of the iconoclests, schools of statuary sculptors, who made quantities of furniture of wood, ivory and goldsmiths' work, that the Venetians and Genoese distributed th through the East. We possess in our museums and our libraries a good number of those objects preceding the 12 th century. I It does not always appear, that the Byzantine artists devoted themselves to grand statuary, and the examples mentioned here are altogether of small dimensions and frequently of barbarous execution. It was not the same for painting; the Byzantines had produced in that art works ent-rely remarkable, and of which we can form an idea by the paintings of the churches of Greece,[2] and by the vignettes of the manuscripts of the Imperial Library.

Note 1.p.108. See the work of count Melchior de Vogüe and M. Duthoit on the cities between Aleppo and Antioch. (Syrie centrale)

Note 2.p.108. M. Paul Durand has traced a great number of those paintings, that date from the 8 th, 9 th, 10 th and 11 th centuries, and that are in a most beautiful style. It is much to be desired that these tracings should be published.

Now among these crusaders starting from different points of the extreme West, from the beginning of the 12 th century tell of numerous motives of ornamental sculpture of beautiful character, others of ornamentation and of statuary.

For example, we see at that epoch Poitou, Saintonge, Normandy, Isle-de-France, Picardy and Auvergne place on their edifices scrolls, capitals, ornamental friezes of very beautiful style and good execution, that seem copied, or at least directly inspired by the Byzantine ornamentation of Syria, while beside those ornaments the statuary remains in a barbarous state, and does not appear to make sensible progress. But if we transfer ourselves into Burgundy, on the banks of the Saone into the vicinity of the principal Cluniac monasteries, it is entirely different. Statuary made at the beginning of the 12 th century advances as rapidly as sculptured ornamentation, and also recalls still less by its style the Byzantine dipticons, than the paintings ornamenting the Greek manuscripts. T That explains itself. If rude monks and ignorant workmen could reproduce the Greek ornaments, that abound on the edifices of northern Syria, they could not copy statues or reliefs with figures, that did not exist. They orientalized the sculptured decoration, and remained Gaulish for the statuary. To transfe in the art requires a certain degree of instruction and knowledge, that then those Cluniacs alone possessed. The Cluniacs then caused among themselves a renaissance of statuary by the aid of Greek painting. That is evident to anyone f familiar with that art. For example, if we transfer our selves to before the tympanum of that grand portal of the abbey church of Vezelay, or even before that of the grand portal of the cathedral of Autun, which is somewhat later, we shall recognize in these two examples, and particularly in the first, a pronounced and incontestable Byzantine influence, and still that statuary does not recall the Byzantine dipticons, neither

in composition nor execution, but rather in paintings.

As much as Byzantine statuary of the old time takes a hieratic character, is restricted in its means and conventional, by so much is painting accented by a dramatic tendency, composition, accuracy and vivacity of pose. [1] These same qualities are found again in a high degree in the reliefs, that we have just mentioneda Further, in those reliefs the draperies are treated as in the Greek paintings, and not as they are on the sculptured Byzantine monuments. The composition of the reliefs of Vezelay by the manner in which the personages are grouped, likewise recall the compositions of Greek paintings; one notes several planes, effects of lines and a very pronounced dramatic movement. But in even that the Cluniacs transposed one art into the other, while allowing to be seen the source from which came the statuary, for a multitude of details they were compelled to resort to the imitation of objects around them. Thus the architecture, furniture and instruments are French, the clothing itself, except that of certain sacred personages, that is evidently copied from the Greek paintings, is that b brought from the West, by it is Byzantized (pardon us the barbarism) by the manner in which are rendered the details. As for the heads, and that merits fixing the attention of archaeologists and artists, they nowise recall the types adopted by the Greek painters. Western sculptors have copied as well as they could the types, that they saw, and that frequently with a delicacy of observation and very remarkable largeness.

Note 1.p.107. It is unnecessory to take up here the Greek pointing, for example, such as the monks of Mt. Athos have made since the 18 th century, and are still making today. That is a congealed art, entirely of recipes; the paintings of manuscripts of the 8 th, 9 th and 10 th centuries have a freer character and an entirely different value. We shall say as muc of the Greek paintings collected by M. Paul Durand.

We have frequently heard this point discussed, to know whether those reliefs of Vezelay, Autun, Moissac, Charlieu, etc., were sculptured by artists sent from the East, or were due to western sculptors working under Byzantine influence. We have hesitated long over this problem; but having examined many of these French sculptures, Greek sculptures and paintings, particularly vignettes of manuscripts; after having collected

drawings and photographs in great number for direct comparison our hesitation was compelled to end. Besides, if Greek artists had been called to France to execute those sculptures, they would have betrayed their origin in some points, an inscription, furniture, utensils. Nothing of the kind is found on any of those reliefs. All is western, and also the sculpture of the Byzantines at that epoch is not treated like that of those French reliefs.

In that French statuary that we regard as derived from very old Byzantine painting, -- for certainly the vignettes of manuscripts served as types to the Cluniacs, and those manuscripts might be very much earlier than the 12 th century, -- one of the qualities that strike most the persons who know how to observe, is the accuracy and striking truth of the pose. Now w when one recalls the degree of barbarism into which the statuary of the 10 th century had fallen, and how this quality was then forgotten, artists from the schools of Cluny must have had recourse to models of great value as art, to train themselves.

But it is with this historical fact as with many others, it is necessary to beware of establishing a system by a single group of observations. What is true here may be erroneous there. If the Cluniacs at the beginning of the 12 century succeeded in forming a school of sculptors with the elements just indicated, it is evident that on the banks of the Rhine, in Provence and at Toulouse, the Byzantine influence made itself felt before the crusades, and allowed the formation of relatively flourishing schools of sculpturea On the banks of the Rhine, the efforts that Charlemagne had made to revive the arts had borne some fruit. That prince was surrounded by Byzantine artists, and had received from Byzantium and Syria considerable gifts of objects of art. After his reign the traditions introduced by the oriental artists, the objects collected in the monasteries and Paris allowed the formation of a pseudobyzantine school, that did not fail to have a certain relative value. In Provence, a part of Languedoc, and notably at Toulouse, another school was constituted after the 11 th centurw, based on such numerous examples of art objects brought from the East by the commerce of the Mediterranean.

In the 10 th century the Venetians had agencies in a certain

number of the cities of the South and even at Limoges. Those merchants supplied the provinces of the South and Centre with oriental silken fabrics, jewels, coffers and articles of ivory and of metal made at Constantinople, Damascus, Antioch and T Tyre. It suffices to see the sculptures of the 11 th century still existing around the choir of S. Sernin of Toulouse and in the cloister of Moissac, to recognize in that statuary rude copies of Byzantine ivories. Here (Fig. 2) is one of those e examples from the cloister of Moissac. This image of S. Peter in marble is in very low relief. One finds there not only the character of the sculptures of Byzantium, but the execution, the hieratic mannerism of the style, and even the procedures for indicating the draperies. It is certain that the artists who carved these images regarded neither nature nor even the numerous fragments of Roman antiquity, that abounded in that country, but had eyes only for these Byzantine works in ivory, copper or wrought silver, then constantly exported from Constantinople. Everything in that sculpture is conventional; one finds there only the effaced traces of an art proceeding only by recipes. But from that sculpture that so strongly shows the decadence, to what was done scarcely a century later in the same provinces, there is an entire revolution; for the latter has renewed the air of youth that belongs to a nascent art. This is no longer senile barbarism, but it is the beginning of an art that goes on to develop itself. Political causes prevented that school of Languedoc from rising, as we shall soon explain; but what we have just stated explains the diverse nature of Byzantine influences in France during the 22 th and first years of the 12 th centuries. Those artists of Provence, Languedoc and of the Rhine, even because they had in their hands a great number of objects from Byzantium, did not need like the Cluniacs, to transpose the art of painting into statuary; thus their products do not lack that originality of the works of the Cluniac school, that proceeding from painting to sculpture, must put much of its own into the imitations of Byzantine.

At the end of the 11 th century, let us see what was the state of the schools of sculpture in the different provinces of existing France. Roman traditions were extenguished nearly everywhere, only allowing to be seen faint lights in the cities

of the South. The remains of Roman monuments in Provence were sufficiently numerous, that a school of sculpture reviving at that epoch was chiefly inspired by the antique statuary, whil it sought ornaments and architectural forms in the East. [1] Th school of Toulouse had abandoned all Roman traditions, and in statuary was inspired by numerous sculptured examples brought from Byzantium; the ornamentation was then a compromise betw- een Gallo-Roman traditions and examples from Byzantium. In t the Rhenish provinces the Byzantine element, though changed, dominated in statuary and ornamentation. In the western prov- inces, Perigord, and Saintonge, statuary was almost nothing, a and the ornamentation was Gallo-Roman, although S. Front had been built on a Byzantine plan. At Limoges and the neighborin cities toward the East and South, the vicinity of the Veneti- an agencies gave birth to a very flourishing school based on Byzantine types. On Auvergne, Nivernais and a part of Berry, Byzantine traditions inspired the statuary, while the ornamen tation retained a Gallo-Roman character. But those provinces were through Limoge in relations with the Venetians, and re- ceived thus a great number of objects from the East. In Burg- undy and Lyonnais, the Cluniac school alone produced works of original value in statuary as in ornamentation by motives den noed above. In Isle-de-France the statuary had no value, and the ornamentation, like that of Normandy was inspired by Byza ntine compositions, because of the great quantity of oriental fabrics, that penetrated into those provinces by the commerce of the Venetians and Genoese. In Poitou statuary had likewise fallen into the rudest barbarism, and the heavy ornamentation was a mixture of Gallo-Roman traditions and of Byzantine inf- luences furnished by the fabrics and utensils from the East.

Note 1.p.110. See Art. Porte, Fig. 88 and accompanying text

If one consults the map that we drew to accompany Art. Clo- cher (Fig. 6), he will take account of a part of those divis- ions in schools, although the arts of sculpture do not have exactly the same centres as those of architecture. Thus there is a school of Norman architecture at the beginning of the 11 th century, and properly speaking, there is a school of Norma sculpture. The school of sculpture of Isle-de-France commenc- ed to radiate only about the end of the first half of the 12 th century as far as Chalons-sur-Marne, the sculpture of the

banks of the Rhine does not penetrate so far to the West. Toulouse at the end of the 11 th century had no local school of architecture, but already possessed a strong school of sculpture. The architecture developed in the western provinces did not possess schools of sculpture worthy of the name until in the 12 th century. Thus one can count in France about 1100 five schools of statuary; the oldest is the Rhenish school; the school of Toulouse, the school of Limoges, the Provencal school, and the last born, the Cluniac school. Now the latter promptly formed new ones on the area of the territory, and e entirely renewed most of those preceding it, by lifting them out of the hieratic path to seek for the true and toward the study of nature. Let us first state that everywhere that the Cluniacs resided at the commencement of the 12 th century, s sculpture acquired a marked superiority, both in ornamentation and in statuary. Are evidence of a contemporary, that of S. Bernard, who was so strongly aroused against those schools of Cluniac sculptors, and who endeavored to oppose their influence, would be a proof of the importance that they had acquired in the 12 th century, if the monuments were not there.

The Cluniac school was indeed the only one that could develop, because in taking as starting point of instruction, let us say, Byzantine art, it observed nature and thus tended to depart from the consecrated types, to withdraw it gradually from the hieratism of Greek arts of the later time, and that it knew how to take as models in these arts, painting that h had retained the freest charm.

Byzantine painting indeed did not exclude individualism at that epoch, while the sculpture appeared to reproduce only t the uniform and consecrated types. The vignettes of Greek m manuscripts from the 6 th to the 10 th centuries present, not only compositions impressed by a freedom not retained by the ivory carvings and articles of goldsmith's work, but which evidently reproduce portraits. These vignettes take into account perspective, the effect produced by different planer and by light; indeed some are profoundly impressed by dramatic expression. [1]

Note 1.p.113. In the works of Dioscorides of the Imperial Library of Vienna, a manuscript of the 6 th century, see the miniature representing Juliana Anicia; the Greek manuscripts,

Nos. 139, 67 and 70 of the Imperial Library of Paris, 10 th century; the manuscripts of the Library of S. Mark of Venice; that preserved at the Louvre. Many vignettes of those manuscripts are notable for the grandeur and energy of the compositions, by the clearness of the pose, and by the entirely individual faces of certain personages. In his Histoire des arts au moyen age, M. Labarte has faithfully reproduced some of those vignettes. In the same work can be seen copies of Byzantine ivories from the 5 th to the 11 th centuries made by photography, that by their hieratic character form a striking c contrast to those paintings.

We shall show how the Cluniacs introduced in sculpture, imitated in execution the style from the Byzantine school, those elements of freedom and observation of nature, both by the c correct reproduction of pose, and by the study of the types that they had under their eyes. The principal portal of the abbey church of Vezelay, a work of great value for the epoch, will supply us with the most remarkable examples of this pseudobyzantine statuary of the Cluniacs, at the end of the 11 th or during the first years of the 12 th centuries.

51 The entirety of that work is presented in Art. Porte, Figs 11. One will note at first that there is in that composition a movement, a staging, that does not exist in Byzantine compositions of the same or of preceding epochs. The dramatic exists in the midst of these groups of personages, to which the artist desired to give life and movement. Let us see the details; here (Fig. 3) are two figures of 3/4 natural size, sculptured on the right jamb; S. Peter is disputing with another attentive apostle, seeming disposed to reply. The gestures of S. Peter are clear and well accented, and his head assumes an expressioy of serious insistence, that is entirely remarkable. Besides this realism the execution of the draperies, t the mode in which they are arranged, those folds moved by the wind, savor of the Byzantine school. Carefully examining the types of the heads of these statues, one recognizes that they have nothing in common with Byzantine statuary. The Cluniac sculptors are inspired by what they see around them. Those h heads present individual characters and are not conventional types. On the capitals of the same portal are personages furnishing varied types; one at A (Fig. 4) has a lonm and thin h

nose,brow bald, large eyes with the outer angle slightly raised, mouth small, lower lip projecting, chin round and beard silky. The other at B has a short nose, eyes covered, large mouth and developed jaw. The head of the first is long, that of the second round. The woman's head at C presents another type. That woman is clothed only in a short petticoat of wool, and holds a thing with her right hand; to her left arm is attached a sort of shield decorated by a cross, behind which s she seems to conceal herself. That is a S. Madeline hunting in the desert for her food. A great bird is before her. Did the sculptor desire to give to that head a character that he supposed oriental? What is certain is that the features of that woman differ from the types adopted in the sculptures of the monument. The eyes are long, the cheek bones are projecting, the chin and mouth are strongly accented, the nose very dilicate and recurved. There is then in that school already a search for faces, features, for nature. If we look at the feet a and the hands of the personages of these reliefs, we can likewise discern an already refined study of nature, men have recourse to it, the Byzantine influence makes itself felt only in the mode of expressing the folds of the draperies, in certain procedures adopted in forming the hair and accessories; the same observation can be made on the relief of the cathedral of Autun, a relief later than that of Vezelay by 20 or 30 years at most, and in a less beautiful style. But in that work of sculpture, the types of heads have a very pronounced character, that is nowise Byzantine.

That one of those heads that we give in Fig. 5, and that we could have in our hands because it was broken off and cast into the rubbish when the relief was walled up at the end of t the last (18 th) century, reprodules one of those types generally adopted in this scupbpture . This entirely particular t type has nothing Roman or Byzantine, but it possesses a pronounced Asian character; it seems to belong to the beautiful Caucasian reces. The lines of the front of the nose, the delicacy of the mouth, the insertion of the eye, covered and slightly raised at the outer angle, the length of the cheeks, t the slight accentuation of the cheek bones, the extreme smallness of the ear, the silky and curled beard, indicate a beautiful race, neithe Roman nor German..The eye is filled by a

ball of blue glass, and the eyebrow is accented by a painted black line. This type of head is nowhere found in the figures of Vezelay, where generally the foreheads are high and developed, the distance great between the mouth and nose, the eye very open and the cheek bones pronounced. But what is to be noted is, that if one walks about in the country of Morven in parts most remote from travel, he will quite frequently meet that beautiful type among the young peasants. Thus here in two monuments very near together, -- since Autun is only 56.3 miles from Vezelay, the same school of sculptors having taken as starting point the study of Byzantine arts, which is inspired by the varied types furnished by these localities. But if we penetrate into other regions subject to other schools, we shall likewise find at that epoch, i.e., from 1100 to 1150, the same tendencies toward the study of nature and the observation of local types.

One will understand that it will not be possible for us to supply the quantity of examples comprised in such a subject, which would demand an entire work for itself alone. We must restrict ourselves to indicating some salient points in order to attract the attention of artists, architects and anthropologists, to questions, whose value is too much disdained.

We have spoken of the school of Toulouse, entirely Byzantine in the 11 th century. Like its sisters, in the 12 th century this school partly abandoned the Greek treatment of the late time to seek the study of nature.

The little city hall of S. Antonin [1] is one of the prettiest edifices of the middle of the 12 th century, i.e., of about 1140. It belongs to the school of Toulouse. Its sculpture is treated with care and rare perfection.

Note 1.p.116. Art. Hotel de Ville, Figs. 1,2,3.

Among other figures on one of the capitals of the gallery of the second story of this monument is sculptured a king whose face we give (Fig. 6). If any head be well characterized, evidently taken from nature, this is it. Broad forehead, eyes well opened and large, the arched eyebrows distant from the ball of the eye, nose refined and curved, narrow at the root of the nostrils, which are thin and raised; the lips firm and clearly bordered; the beard in long locks, the ears spreading from the head, the hair long and silky, is not this one of th

those Slavic types such as one finds in Hungary and on the b banks of the Danube.[1] Besides that head are others presenting a character absolutely different, and that approximates the t types more frequently adopted in the statuary of Toulouse.

Note 1.p.117. Like all sculptures of that edifice, this head was painted. One still sees the trace of pupils of grayish blu

Let us pursue this survey before resuming the order that we should follow in this Article.

Let us go to Chartres. The western portal of the cathedral presents a series of statues of very careful execution. There are great and tall figures that seem swaddled in their clothing, like mummies in their bands, and that are profoundly permeated by the Byzantine tradition in the execution, though t their clothing is western. The heads of these personages have the appearance of portraits executed by masters. We will take one of them, that all persons know who have visited that cathedral (Fig. 7).[2] Those statues of Chartres also date from about 1140. Certainly the artist that sculptured this head, however subject to Byzantine rules in certain respects, wandered from it still more than those, whose works have just been presented, from the point of view of the study of nature. Of the types just presented, that alone has a character truly French or Gaulish, or Celtic if you will. This flat forehead, those raised eyebrows, eyes flush with the head, long cheeks, nose wide at the base and slightly curved downward, straight on n his profile, large and firm mouth, distant from the nose, the lower part of the face square, ears flat and developed, long wavy hair, have nothing of German, Roman or French. It seems to us that this is a true type of the ancient Gaul. The face is broad in relation to the head, the eye can easily become s sarcastic, that mouth scorns and rails. There is in that entirety a mixture of firmness, grandeur and refinement, indeed a little lightness and variety in those raised eyebrows, but also intelligence and coolness in the moment of peril. The face of the other statues of this portal all have an individual ch character; the artist or artists who sculptured them have copied around themselves, and have not restricted themselves to reproducing an uniform type. This fact merits better being o observed, that toward the end of the 12 th century, as we shall soon demonstrate, statuary adopts an absolute type that it

regards as perfection, and no longer occupies itself with the individuality of personages.

Note 2.p.117. So far as possible these drawings have been made from casts in our possession, or from photographs.

There still exist in the abbey church of S. Denis two statues transferred by Albert Lenoir to the museum of French monuments and taken from the church Notre Dame of Corbeil; those two figures are baptised with the names of Clovis and Clotilde without authority, and are of the same epoch as those of the western portal of Chartres. Tall like those, executed with e extreme care, also remarkable in style, very interesting from the point of view of the clothing, rendered with great delicacy, they furnish types of heads that in nothing recall those of Chartres. Here (Fig. 8) is that of the king. This face is not a reproduction of an accepted type, of a canon; for one that knows how to see, it is a portrait or rather a racial type, an individual in particular. The large eyes, opened like those of the most beautiful races from the northeast, cheeks flat, nose well made and straight, mouth small and well cut, upper lip projecting; forehead very broad and flat, eyebrows fleshy and following the contour of the ball of the eye, beard supple and moustaches pronounced, hair abundant and long; all these features belong to the character of face given to the Merovingian race. Let this face be compared with that given in Fig. 7, and one will find between the two types the difference that separates the Merovingian, or the last people from the northeast, from the old Gaulish blood. The last type in Fig. 8 is evidently more beautiful and noble than the other. In t those great and well opened eyes is a tenacious boldness, in that delicate mouth is something ingenuous, that does not exist in the face from Chartres. With these two heads parallel, one understands that the type No. 8 dominates by boldness and the consciousness of his dignity over type 7; but one also understands that the latter, in whose face appears a certain s skepticism, will end in becoming a master again. In the features of the king and notably in the mouth is a naturalness ve very far from the expression of the face from Chartres. The h head of the queen taken from the portal of Notre Dame of Corbeil, and that forms a pendant to the statue of the king is no less remarkable. But to show better with what refinement those

schools of the 12 th century in France reproduced the charac- ters of the human types, that they had under their eyes, we p place in parallel the face of the statue of a woman from the portal of the cathedral of Chartres and that of the statue f from Corbeil (Fig. 9).

If one demands which of these two women is the mistress and which the servant, no one would be deceived; there is in the queen A from Corbeil a distinction, a feeling of dignity, an intelligent gravity, that cannot be found in the head o from Chartres. But if we place in parallel the head of the woman from Chartres with that of the man (Fig. 7), these two types indeed belong to the same time; if we see together the heads of the king and queen from Notre Dame of Corbeil, it is evid- ent that those personages also both belong to the same race. Whatever of raillery or bitterness is in the mouth of the man of Chartres, is translated into the face of the woman by an expression of malicious good nature. The eyes of these two faces are cut the same, the eyelids partly cover the eyeball; the nose is broad at the base and the jaw is developed. The personages of Corbeil both have their eyes well opened, the arched eyebrows are similar, mouths are identical, jaws refi- ned and delicate noses. [1]

Note 1.p.121. The two statue from Notre Dame of Corbeil we were painted. One still sees on the head of the woman the col- oring of the eyebrows and pupils. But we shall return to that question of painting of statuary.

Let us enter another province; in Poitou about the same ep- och, i.e., from 1120 to 1140, statuary abounds on the monume- nts. This statuary is strongly impressed by the Byzantine st- yle, but still individualism and the study of nature make t themselves felt.

Here (Fig. 10) is the head of a woman forming a part of a r relief representing the birth of the Saviour on the facade of Notre Dame la Grande at Poitiers. Who does not recognize there one of the types so collon in Poitou? The outer angle of the eye is depressed, the nose is strong and straight, forming a continuous line with the forehead, which is well shaped but lou, the upper part of the head flat, the mouth near the nose and the lips fleshy, the jaw round, developed and large, the hair smooth. But we must limit this examination of the human

types to some examples and resume the history of the different schools of sculpture on French soil.

Byzantine influences have not been the only ones that allowed the art of sculpture to rise from the state of absolute b barbarism into which it had fallen.

It is certain that some elements of art, very little developed indeed, had been introduced by the invaders of the 5 th and 6 th centuries. The Burgundians, among all those barbarians from the northeast, seem to have brought with them some of those elements entirely foreign to the arts of antique Rome and even of Byzantium.

There exists in the crypts of the old rotunda of S. Benigne at Dijon, rebuilt in 1001 by abbot William, fragments of the edifice of the 6 th century. Those fragments consist of the remains of mouldings and of sculpture, which have a particular interest in our eyes. One of the capitals found in the masonry of the beginning of the 11 th century, and that consequently can only have belonged to an earlier monument, has nothing that recalls the Gallo-Roman style. That strange sculpture, of which we give a drawing (Fig. 11), rather approaches certain types of the ornamentation of India.

It is an interlacing of monsters among which are distinguished serpents. Certain old sculptures of Scandinavia and of Iceland have an incontestable relationship with this capital. One finds there this abundance of monsters, this work by sinkings, those ornaments in the form of palm leaves and those i interlacings.

"The conquest of the southern and eastern provinces of Gaul by the Visigoths and the Burgundians was far from being as v violent as that of the north by the Franks. Strangers to the religion that the Scandinavians propagated around themselves, those peoples had emigrated with their wives and children from necessity into the Roman territory."

"It was by repeated negotiations rather than by force of a arms, that they had obtained their new homes. At their entrance into Gaul they were Christians like the Gauls, although of the Arian sect, and they showed themselves tolerant, especiallw the Burgundians. It appears that this good nature, which is one of the existing characters of the Germanic race, showed itself early among this people. Before their establish-

establishment west of the Jura nearly all the Burgundians were men of trades, workers in carpentry or joinery. They gained t their living by this labor in the intervals of peace, and thus were strangers to that twofold pride of the warrior and of the secular proprietor, that nourished the insolence of the other barbaric conquerors."

Note 1.p.123. See Aug. Thierry. Lettres sur l'histoire de France. (Latin note).

Indeed it is in the provinces of Roman Gaul in which the Burgundians and Visigoths established themselves, that we can indicate an art feeling foreign to Gallo-Roman traditions. In those provinces of the East conquered by the Burgundians, and in Aquitaine occupied by the Visigoths, the schools of sculpture more particularly developed before the 12 th century, while the provinces occupied by the Franks remained attached to the Gallo-Roman traditions until the moment of the first crusades. The Normans did not fail to bring with them some art f ferments, but this was limited to those ornaments found among the Scandinavian peoples and did not concern statuary, which seems to have been entirely foreign to them. If the oldest N Norman monuments, i.e., those of the 11 th century, retain some traces of sculptures, these are limited to rude interlacings, to imbrications and sinkings; but the figure appears there only in the state of a monster, also it is rare.

Had the Scandinavian invasions that occurred after the 6 th century on the western coasts also deposited some germs of t that ornamentation by interlacings and twisted monsters, that one finds again in the 11 th century on the monuments of lower Poitou and of Saintonge? This we cannot decide. However that may be, this ornamentation no longer retains the degenerate Gallo-Roman character, that one still finds entire in Perigord, Limousin and a good part of Auvergne during the 11 th century, and that did not cease to be represented in Provence until the 13 th.

We have shown by one example (Fig. 2) what statuary became in the 11 th centurw in the cities of Aquitaine that had retained schools of art. It was no more than a rude imitation of the Byzantine ivories scattered by dealers in the West. Yet t this province, like those of the North and East, at the beginning of the 12 th century made an effort to abandon the hierat

hieratic types; it also sought the dramitic, the true expression of the pose, and it did no longer disdain the study of nature. The museum of Toulouse and church S. Sernin offers us very beautiful specimens of this transition from the flat imitation of the types brought from Byzantium to a very developed art, although still impressed by Greek Byzantine principles.

The fragment (Fig. 12) that represents a sign of the zodiac, and that forms a part of the museum of Toulouse, dates from the first half of the 12 th century. The figure is three fourths of the natural size. There is in that sculpture a movement a seeking for effect, a manner that one finds in Greek paintings but not in the sculptures. Thus it seems that the method adopted by the Cluniacs, consisting in inspiration from the paintings rather than Byzantine sculptures, was thenceforth adopted by the principal schools of France. But one can distinguish in the centre of art, that developed at Toulouse in the 12 th century in such remarkable fashion, two schools, one tending to exaggeration of the types accepted by the Greek pa painters, the other inclined toward the imitation of nature. A certain number of capitals deposited in the museum of Toulouse, taken from the cloisters of S. Sernin built about 1140, are of a refinement in execution,and exceptional research in style. The scenes represented on these capitals, from the point of view of the study of nature and particularly of pose, are in advance of the schools of the adjoining province and even of those of the North.

Here (Fig. 13) is a fragment of one of those capitals representing Salome, the daughter of Herodias, at the moment when she obtains from Herod, during a feast and dancing before him, the head of S. John Baptist. The poses of those two persons are expressed with delicacy, indicating the subject with a certain graceful mannerism. The draperies, the details of the extremely rich clothing, are rendered with a precision, vivacity and style, that one no longer meets at that epoch in the enfeebled sculpture of the Byzantines.

Those beautiful schools of Toulouse of the 12 th century, from which remain such remarkable fragments, were extinguished during the cruel wars against the Albigenses. Yet if one considers their works at Toulouse, Moissac, S. Antonin, S. Hilaire[1] S. Bertrand of Comminge,[2] one can admit that they could nev

rivaled the best schools of the North during the 12 th century. To produce a free art, advancing by the study of nature, taking a hieratic art as starting point, is what was done with incomparable success by the Athenians of antiquity. From the so-called Eginetan sculptures, i.e., still profoundly impressed by a hieratic character, to the sculptures of Phidias,was 25 or 50 years. Now we see the same phenomenon produced in France. From the statues of Chartres, Corbeil, Chalons-sur-Marne, Notre Dame of Paris, [3] S. Loup, to the statuary of the western portal of the cathedral of Paris is an interval of about 50 years, and the change is immense. In that statuary of the first years of the 13 th century is no longer anything, that recalls Byzantine methodsl no more than one finds traces of the Eginetan statuary, all impressed by the hieratism of Asia, in the sculptures of the temple of Theseus or of the Parthenon.

Note 1.p.126. A magnificent marble sarcophagus of the 12 th century.

Note 2.p.126. The cloister.

Note 3.p.126. We here speak of the tympanum of the portal S. Anne (right portal of the western facade), which dates from about 1140.

If we regard art from a philosophical point of view, that merits serious attention, and tends to destroy an opinion generally held, that are cannot be developed in the direction of progress, if it takes as starting point an art in its decline confined within hieratic formulas. But the Greeks seized on the already enfeebled arts of Asia and Egypt just as one adopts a language. In a brief time with those elements, from which before them none knew how to derive more than a certain number of ideas formulated in the same manner, they knew how to express everything.

How could that phenomenon be produced? Did they regard hieratic art merely as a sort of elementary means of instruction, a means of first obtaining a certain perfection in execution, a step already ascended and below which it was useless to descend again? When their artists had learned the trade by means of those arts, very developed from the point of view of material execution, when assured of the stability of their hands, when (to use again a recent comparison) they had a perfect knowledge of the grammar, then only did they seek to manifest

their own ideas by the aid of this language that they knew w well. Once certain to not fall into a material execution inferior to that of Asian arts, they no longer tried to reproduce the types, but turning to nature, studying its physiological and psychological forces with incomparable delicacy, they pushed on the search for the ideal or rather of idealized nature. How was that? First from the more or less faithful reproduction of the hieratic types that served them as models, t they came to seek the imitation of the living types around t them. This effort is visible in the Doric sculptures of Sicily, of Magna Grecia, and in those most ancient in Hellas, as with the Egyptians and Assyrians, the portrait, if not of the individual but of the race, appeared in Doric statuary immediately after formless attempts.

But instead of doing like the Assyrian and Egyptian artists, who perpetuated those reproductions of types and came to express them in a manner absolutely conventional; who possessed formulas and patterns for making a Lybian, Nubian, Ionian, M Mede or Carian, the Greek gradually combined those different types of individuals and even of races; he subjected them to a sort of gestation in his brain, to produce an ideal being, the supreme man. This was not the Mede or Macedonian, the pure Semite or Egyptian, Syrian or Scythian, but is man. Seeking a perfect abstraction he cannot stop; he unceasingly retouches that abstract model, which is a creation continually replaced in the mould, and even in that he always seeks, always goes forward, and having mounted as high as the artist can attain, he must descend again. Thus the Greek turned his back to oriental hieratism.

This phenomenon in the history of art is reproduced identically at the end of the 12 th century over a great part of the French territory. If the elements are less pure, and the results are less considerable, the process is the same.

The statuaries of the 12 th century in France commenced by going to school to the Byzantines; it was first necessary to learn the trade, and it is by the aid of Byzantine models, t that this first instruction is given. Yet the western artist could not only abandon the hieratic reproduction when he knew his trade, and looks around himself. Faces strike him; he commences by copying types of heads, while retaining the Byzantine

manner in tne draperies, the nudes and the accessories. Soon from all these types he brings forth an ideal,the beautiful, that he attains. That this beauty and this ideal may not be the beauty of the ideal found by the Greek, must be so, since in this world similar causes never twice produce identical r results; we recognize that this ideal may be superior to that dreamed of and found by the Greek, in regard to the absolute beauty, but this art movement is no less one of the most remarkable facts of modern times.

The conditions applied to the art of statuary by Christianity, were they as favorable to the development of that art as had been the state of society in Greece? No. Among the Greeks religion, habits and customs, everything concurred in the development of the art of statuary. If the Athenians did not wal entirely nude in the streets, the gymnasium and the games constantly in the eyes of the people emphasized the physical advantages of man, and the inhabitants of Greek cities could re recognize the physical beauty of the human body, just as in our days the people of our cities distinguish at first sight a well dressed man wearing his clothing with ease from a boor. Art not being able to develop in observing and reproducing w with distinctness the physical side of the human body, must appear in another way. Then it devoted itself to studying the reflection of the soul in the features, in the pose, in the m mode of wearing the clothing and arranging it. And thus restricted, it again attained a great elevation.

If they we desire to consider the art of the statuary in a antique times and in the middle ages on the historical side, forgetting the repetitions of the modern school, we shall be brought to this conclusion; that the customs introduced by Christianity being admitted, the statuaries of the middle ages derived from the better part, and knew how to develop their art in the sense of the possible and the true. Instead of seek ing, a we see done today, to reproduce the models of Greek antiquity, they have taken their time as it was, and they found for it an intelligible and living art, suitable to instruct and to elevate the spirit of the people. Such a result m merits we,, that one should decide that those artists have a attained the beautiful and the ideal, especially within such narrow restrictions. To accuse them of not sculpturing Christ

and the Holy Virgin nude like Apollo and Venus, is to make a singular quarrel with them, the more so that the Greeks themselves were only quite late so in love with physical beauty unveiled. But the necessity of clothing statuary being an affair of customs, to know how to give to the face beautiful features and a very exalted expression, to the pose a true and always simple feeling, to the draperies a style full of grandeur, was a real art movement, novel and original, certainly more s rious than could be the eternal imitation of the types of antiquity. Those imitations of manner, that have been so much abused, it is true lower by a step the masterpieces of t the fine times of Greece in the minds of the art lovers, and this is what emphasizes the inappreciable value of those work but that cannot cause them to be esteemed more by the multitude, and also that statuary of our days has become a matter of luxury supported my the government, responding to no need, to no tendency of the intelligence of the public; now we do not think that an art exists, if it is not understood and loved by all.

At Athens the entire city had a passion for a statue. On t the contrary at Rome, objects of art were the enjoyment of some; thus imperial Rome had no art peculiar to it, at least in statuary. During the fine time of the middle ages the art of the statuary was understood, it was an open book where everyone read. The prodigious quantity of works of statuary executed at that epoch proves how much that art entered into the customr. It is necessary to consider further that if all those sculptures are not masterpieces, there is not one that is vulgar; the execution is more or le s perfect, but the style and the idea are never wanting. Statuary fulfils a purpose, means something, knows what it desires to say and always says it. One could defy anyone to find on a monument of the middle ages a single figure occupying a plece without reason, as done daily in the 19 th century, only to place somewhere a statue purchased by the State from M. X.

A statuary in his studio makes a statue for a public exhibition; that statue thirty years ago was a Cincinnatus, a Solon or a nymph; today it is a young shepherd, or a metaphorical idea, Hope, Waiting or Despair. Two or three private persons in France or the State alone can purchase that statue. When

acquired, where shall it be placed? In a garden? In a provincial museum? In an empty niche on some edifice? In a chapel or in a vestibule of a palace?

Thus the statue conceived in a studio, without knowing its destination, whether it will be lighted by the rays of the sun or by inside light, this statue purchased by persons that have not ordered it for a purpose and who do not know where to place it, we ask why that statue will produce an impression on the public? Excepting some amateurs that appreciate certain qualities in execution, who will interest themselves in it? Who will look at it?

If the Athenians saw those empty niches on our edifices, a awaiting unknown statues, and these statuer in the studios de demand places that do not exist, we believe that they would find us with singular ideas on the arts, and going to see the portals of Chartres, Paris, Amiens or Rheims, they would ask us what people, now scattered, were the authors of those wonders. But if we should reply to them, as would be right, that those past masters were our barbarous ancestors, and that we being civilized persons, practice the art of statuary for five or six hundred amateurs or pretenders in France; that otherwise the multitude is not able to understand those academic or products developed with great difficulty in a hothouse, the Athenians would laugh at us.

The great misconception is to assume that the beautiful is attached to one single form; now the form covering the beautiful and the essence of the beautiful are two distinct things, as can be a thought and the mode of expressing it, the creative principle and the mode of expressing it, the creative principle and the creation. The modern error of statuaries is to believe, that by reproducing the envelope they reproduce the being; that in copying the instrument, they convey the idea of the melody.

The relief ideal of the Greek possesses the agent, the soul, the life that caused it to be composed, because the Greek has logically sought a form to render his thought and found it; but to make the inverse operation, to take only the relief i imitation, since we can neither have the ideas nor the intellectual operations that guided the artist, and to believe that in this corpse is to enter a breathing, is an illusion as sin-

singular as would be that of a maker of artificial flowers awaiting the unfolding of a rosebud made by her with rare perfection. The marvellous thing is to hear ourselves accused of materialism in art matters by those, who see in the art of statuary only the indefinite reproduction of a type recognized as beautiful, but to which we are powerless to restore the soul tha caused its production! On the contrary we pretend to believe ourselves spiritualists when we say:- "Either have the ideas of the Greeks of the forces of nature, on the emanations from the divinity, and live in their midst, if you desire to attempt to produce statues like those that they have left us, or if you cannot recover those conditions, seek to be a believer and express by the formative arts feelings that impressed believers, it is very possible that Phidias was not a doubter, but it is necessary to live in an atmosphere of current ideas to be able to give them a comprenensible value, to be able to animate the block of marble or stone. A pagan atheist might be seized by respect before the statue of Jupiterof Olympus by Phidias, because however atheistic that man, he takes into account the elevated idea that the Greek attached to Zeus, and lived in the midst of people that adored him. Intelligence in him separated from incredulity. But we say again, that it is also rather the intelligence, that permits an artist to produce an impression, to give life to his creation. It is understood that we here take intelligence as the intellect, the faculty of appropriating and rendering ideas, even not belonging to you. -- It is with that as with t the actor that generally produces more effect on the public, when he understands the feelings that he expresses, not because he is moved by themand that they emanate from him, but because he has observed how those act that do experience them. Now is it possible for us today to believe that we make statues for Greeks of the time of Pericles? Can there be between the public and us that continuity of ideas -- admitting that we are learned mythologists -- which existed between Phidias and his public? That community of ideas not existing, can those figures that we make in imitation of Greek statuary have a soul, emanate from an idea intelligible to the multitude? Certainly not and hence those works are purely material. Never apply the a accusation of materialists to those that seek anything in sta-

statuary more than a reproduction of types, that have no longer life in the midst of our society, and who believe that t the first condition of art is the idea that creates it.

We are going to see how the idea evolved in the middle ages, the attempts made by the schools of statuaries of the 12 th century. We have attempted to make felt how those statuaries instructed by Byzantine methods gradually left aside Byzantine tradition, and sought individualism, i.e., set themselves to copy faithfully the types under their eyes. Yet all the schools did not proceed in the same manner; while those of t the North passed from hieratism to realism or rather mixed traditions, methods of execution of the Byzantine with a scrupulous imitation of the nude parts, heads feet and hands, o other schools manifested different tendencies. The beautiful school of Toulouse tended to execution increasingly delicate, scrupulously studied the pose, draperies and dramatic expression. The Provencal school was under the influence of Gallo-Roman sculpture, and with difficulty separated itself from t those numerous models scattered over the soil. Another school made efforts to refine Byzantine methods without seeking the affectation of the school of Toulouse or tending to the realism of the schools of the North.

This school has left traces from Angouleme to Cahors and o occupies a semicircle, one branch of which starts in Charente, developing toward Angouleme, Limoges, Uzerche, Tulle, Brives, Souillac and Cahors. At that point it joins at Moissac the s school of Toulouse. It is known that from a very early epoch of the middle ages, there were at Limoges Venetian agencies. It is then not surprising that the cities just mentioned had very extended and frequent relations with the Orient. So the statuary in those provincis assumes a character of grandeur and nobility, that it does not have at Toulouse. It would seem that the Byzantine influence was purer, or at least that having commenced, it had given time to local artists to develop before the reaction at the end of the 12 th century. Indeed at Cahors on the tympanum of the north portal of the cathedral which appears to belong to the beginning of the 12 th century, exists a great relief with a beauty of style leaving very far behind the sculptures of the same epoch, that one sees at Toulouse and in the provinces of the West. From that relief we

give Christ, which occupies its centre beneath the elongated halo. That beautiful contemporaneous sculpture, or nearly so, has not the dryness and rudeness of that of the portal of Vezelay. Better modeled, more learned, without accenting the tendencies to realism in the schools of the North, nor the affectation of that of Toulouse, it indicates a relatively advanced state in a very broad way, a search for the beautiful in form, that exists nowhere else on French soil at the same epoch.

Indeed, sculpture can only be regarded as an art from the day when it began the search for the ideal. The 12 th century is an epoch of preparation; the artists are occupied in learning their profession, but -- thanks to that freedom and charm that in France always ends in rising to the top, -- attempted to withdraw from Byzantine hieratism, first by seeking in Greek painting the dramatic elements lacking in the statuary, then resorting to nature.

That evolution of French art coincides with an important historical fact; the development of the communal spirit, the weakening of the monastic condition and the dawn of political unity manifesting itself under a predominating influence assumed by the royal power. The art of statuary belongs to the laymen; it freed itself in those beautiful schools, that about the end of the 12 th century freed themselves from monastic tutelage.

There are completed questions here, that do not seem to have been sufficiently appreciated. Historians are little familiar with the study and practice of the arts of form, and the artists rarely seek the causes of the development or the weakening of the arts in a particular state of society. Thus we live under the rule of a certain number of common opinions, whose value no one thinks of checking. That the arts may attain a sort of rapid flowering, as among the Athenians, as at the beginning of the 13 th century with us, and as in certain Italian cities during the 14 th and 15 th centuries, it is necessary to establish a particular social atmosphere, one that we shall name a municipal state, for lack of another name. when by political circumstances cities are led to transact their own affairs, and like Athens they set aside tyrants; that like our cities of the North of France, they have been able to secure a relative independence from powers equally

strong and rivals by giving their support sometimes to one, s sometimes to others; like the Italian republics enriching themselves by industry and commerce; those cities very rapidly form a compact nucleus, living in an intimate communion of ideas and interests developing in a direction favorable to art. Then the political necessity of existence forms stable associations, corporations that the powers cannot dissolve, and that on the contrary they seek to attach themselves. Those corporations, if they are as in France, in presence of a f feudal organization struggling against a monarchical power s seeking to establish itself, soon obtain privileges that ensure their existence. Emulation, the desire of assuming an important rank in the city, of advancing and surpassing neighboring cities, not only in influence but in wealth, of manifesting this progress externally, become a stimulant well suited to open a wide career to artists. This is then no longer to copy in the cells od monks traditional works, without inquiring what passes outside, but on the contrary to rival each o other in efforts and intelligence to make of that urban society a powerful centre, rich and composed of skilled elements, with which it is necessary to reckon, whatever happens.

At the beginning of the 13 th century the monks are no longe masters in arts, they are excelled by a society of lay artists perhaps trained by them, but who have thrown aside their superannuated methods. The court does not yet exist, as it did after the 16 th century. Feudalism was entirely occupied with its intestine struggles, with opposing the encroachments of the higher clergy, of the monastic establishments and the royal power, rarely thinking to obstruct the proceeding in the great cities, which they disliked and resided in the least p possible. One then conceives that in a similar state a class like that of artists would enjoy a very extended intellectual liberty; it is not under the tutelage of an academy; it has no business with pretended connoisseurs, or to please a court; what it regards as the serious progress of the art alone interests it and directs its course.

The attitude taken by the bishops at that epoch with regard to lay feudalism and religious establishments, depending on t the communal spirit tending to organize itself, was favorable to this progress of the arts definitely fallen into the hands

of laymen. Those prelates thought for a moment of establishing a sort of municipal theocracy, such as had occurred at the fal of the Roman empire, and once having become supreme magistrates of the great cities, no longer having to take into account the entire feudal hierarchy, had powerfully aided the arts by the erection of those vast cathedrals, that we still see now.

Those monuments rivaled each other in splendor, and from 1160 to 1240 were the active schools of architects, image-makers, painters, and sculptors, who found these a workyard ofened in each city, on which they retained their entire independence; for the prelates were first of all desirous to erect edifices, that should be the perpetual mark of their protection of the people of the cities, who could consecrate the p power to which they aspired, and refrained from opposing the tendencies of those artists. Far from that, the cathedral must be first of all the monument of the city, its work and property, its protection, a sort of symbol of the alliance between the episcopal power and the commune; it was then for the lay population to erect it, and the less the cathedral resembled a monastic church, the more the bishop must flatter himself at seeing established between the commune and himself that a alliance, which he regarded as the sole means of ensuring his supremacy at the centre of feudalism. The part played by statuary in those cathedrals is considerable. If one visits those of Paris, Rheims, Bourges, Amiens and Chartres, one is astonished, even by the prodigious number of statues and reliefs, that complete their decoration.

Dating from the last years of the 12 th century, the lay school not only broke with the Byzantine traditions preserved in the monasteries, but it manifested a new tendency in the choice of subjects and the manner of expressing them.

Instead of almost exclusively adhering to reproductions of legendary subjects in statuary, as done in the monastic church it opens the Old and New Testaments, is enthusiastic for the encyclopedias, and seeks to make certain metaphysical ideas intelligible to the multitude. It does not seem that men have paid attention to that art movement of the beginning of the 13 th century, one of the most interesting intellectual facts of our history. That it was aided by the episcopate is not 1 doubtful; but that it emanated from the lay spirit is less so.

Then what happens? The chroniclers of the abbeys before that epoch were earnest in boasting of the smallest works due to the monks, and describe with minute care and naive exaggeration the embellishments of their churches; see marble and gold where are employed stone or gilded lead, but are suddenly silent and no longer write a word concerning the structures henceforth entrusted to laymen, even in the monasteries. They s suffer the talent of those newcomers in the practice of the arts, they accept the work, but as for boasting of it or bringing to light its author, they beware. As for the cathedrals, if the chronicle mentions their construction, it shows entire peoples moved by a religious enthusiasm, bringing stones and erecting them as if by the effect of an entirely special grac Now does anyone imagine urban peoples conceiving, drawing, cutting and dressing edifices like the cathedral of Chartres, 1 like those of Paris or of Rheims, and those same citizens taking the chisel to sculpture those myriads of figures? Yet it is by those serious follies that we may judge these arts; as if it were the work of faith, however pure it may be, to teach geometry, drawing, the practice of construction, the art of modeling clay or of carving stone.

In the Cluniac churches of the 11 th and 12 th centuries, s statuary rarely reproduces any but subjects borrowed from the legends of S. Antoine, S. Benoit, S. Madeleine, or even less important persons, and it is necessary to recognize that in these legends the image-makers, who certainly worked then in the monasteries of they were not monks themselves, chose the strangest subjects. For portals, they reproduced the grand scenes of the judgment. They gave the honors of the sacred place to divine personages and to apostles, but elsewhere the scenes of the Old or New Testaments occupy but a small place. When arousing himself against that abundance of sculptured r representations, that he regarded as gross fables placed under the eyes of the people, S. Bernard knew how to forbid statuary to the order instituted by him. The Cistercians of the 12 th century are actual iconoclasts. Whether the bitter censure of S. Bernard struck those minds, or the episcopate in part shared his ideas on this subject, or a philosophical spirit had already permeated the peoples of the great centres, always when the cathedrals were erected from 1180 to 1220, the

statuary of those edifices assumes a character different from that previously accepted in monastic churches. Subjects taken from legends almost entirely disappear. Sculpture seeks its inspirations in the Old and New Testaments, since it adopts an entire system of statuary without precedents. It becomes a representative encyclopedia. If the principal scenes indicated in the New Testament occupy the important place, if Christ is present at the judgment, if the kingdom of heaven is represented, if the history of the Holy Virgin is largely developed, if the celestial hierarchy surrounds the risen Saviour, beside scenes purely religious appear the story of the creation, the combat of virtues and vices, symbolical figures, the Synagogue, the Church personified, the wise and foolish virgins, the earth and sea, terrestrial productions, and the liberal arts. Then the prophecies announcing the coming of the Messiah, the ancestors of Christ, the Davidic cycle beginning with Jesse.

Thus in this statuary of our great cathedrals is an order, one very probably established by the bishops, following a system foreign to that previously adopted in the monastic churches. But besides that order is the execution, that belongs to the lay school. Now in that execution appears a spirit of independence then entirely novel, but which is no less alive. In the representations of vices condemned to eternal hell, kings, lords and prelates are not wanting. The virtues are no longer represented by monks, as on the portals of some abbeys, but by crowned women; the symbolical idea is elevated; among those virtues appear, liberty as at Chartres. Avarice is represented on the portals of the abbey churches of S-Sernin of Toulouse and of S. Madeleine of Vezelay by a man bearing on his neck an enormous moneybag, and tormented by two hideous demons but is represented on the portal of the cathedral of Sens by a woman with hair in disorder, seated on a coffer, that she closes with a very energetic movement. The artist replaces t the material representation by a philosophical idea. No more repulsive scenes, so common in the abbey churches of the beginning of the 12 th century. The statuary of the 13 th century, like the Greek artist, has his decency, and if the represents hell as on the great western portal of Notre Dame of Paris, it is by the restless combination of the lines, by the expression of terror given to the persons, by their strange

movements, that he pretends to describe the scene of that by the details of repulsive and ridiculous torments. The side of the damned on the arches of the principal portal of Notre Dame or Paris is impressed by a ferocious and disordered character, that singularly contrasts with the calm style of the part reserved for the elect. All those figures of the elect express a calmness, a mildness a little melancholy, that makes one t think and that is not found in the statuary of the 12 th century, nor even in that of antiquity.

It is now that we must speak of the expression of the moral feelings, so strongly felt by those artists of the 13 th century, and that classes them in the first rank. Our readers may well believe that we are not going to repeat here what admirers of Gothic art rather enthusiastic than observing, have said of that beautiful statuary, by claiming to place it on a parallel with, and even above the statuary of the good Greek period, while refusing to the latter the expression of the feelings of the soul or rather of a moral state. No; we shall beware of falling into those exaggerations, which prove only o one thing, which is that one has neither seen nor studied work of which he speaks. The artists that in the 17 th century claimed to make expressive statuary were as far from the art of the middle ages as from antique art, a project in spite of all his merit, is not only an artist with excessive mannerism, t taking a rage for the expression of strength, grimaces for the expression of passion, the treathical for the dramatic. Of all the figures of Michelangelo, the most beautiful in our eyes is that of Lorenzo de Medilis in the chapel of S. Lorenzo at Florence. But that statue is very far indeed from the most b beautiful Greek works and does not excel certain productions of the middle ages. Let us explain. Statuary is not an art limited to reproducing in clay or marble an academic work, i.e. , a model more or less happily choses, for that would only be a trade, a sort of work. We think that all are in accord on this matter; everyone (except perhaps some fanatic realists) admits, that it is nece sary to realize nature. How have the Greeks idealized nature? That is by forming a type from individuals. The same ar in a poem, the author can combine all the virtues that he finds scattered among a great number of men, but each one separately has knowledge without also practising it; just

as on a block of marble or with a little clay, the Greek statuary knew how to combine all the beauties borrowed from a certain number of chosen individuals. The moral and physical result of that operation of the artist is to obtain a perfect balance in the intellectual expression. Consequently, however violent the action to which that type is devoted, however vivid his feelings, from the moment that the ideal is accepted (i.e., the beautiful in particular, or balance), grimace is excluded either in pose or by the expression of the features. The Lapithae, who fight so well the centaurs on the metopes of the Parthenon, perfectly express their action, but this is neither by grimaces, by exaggeration of the pose, nor by an excessive play of the muscles. The pose is largely true in its entirety, finely observed in details, but the men do not make contortions in the manner of the personages of Michelangelo. If their features appear to retain a sort of impassability, the movement of the heads, a slight contraction of the eyebrows, express the struggle much better than would have done a distortion of the lines of the face. One cannot pretend tha the heads, unfortunately too rare, statues of the beautiful Greek epoch are without expression; they never grimace; it is unnecessary to look at them after having seen those of Puget, than it is to taste delicate meats after having burned the palate with peppered venison. But to recover that fine expression of Greek heads, this is not to copy them foolishly, and to encumber ourselves with a man of flat imitations it is then better to fall into brute realism and to copy the first model at hand, even if to cast it, which i still simpler. Does this mean that those types of the beautiful discovered by the Greeks were also idealized, and that they excluded individuality? Of the four or five heads of Venus scattered in the museums of Europe and which date from the best epoch, although one cannot mistake their divine quality, do any two resemble each other? Among those heads which seem to belong to a race of physical perfection and intellectual superiority, one has an expression of careless good nature, another allows to be seen through such pure features a sort of jealous firmness, a third will be scornful, etc.; but all, as if to preserve a stamp belonging to antiquity, cause one to think of t the inexcusable fatalism, that casts on their brows a veil of

thoughtful and serious serenity. Shall we find again that atmosphere that will permit us to reproduce such delicate expressions? Do you see around us persons subject to those influences of antique society? Do the brains of today think of the same things? Certainly not. But do our faces say nothing? Is it not possible for statuaries to proceed in the midst of our society as the Athenians proceeded in theirs? Cannot one take from both these physical forms of those dominant moral sentiments beautiful types, which in twentyfive hundred years will produce on future generations the profound effects exerted on us by Grecian works? That should be possible, since it has already been done in the midst of a society with no relations to Grecian society.

That school of the 13 th century certainly had not studied Grecian art in the West, and scarcely suspected its value, b but developed like the Greek school. After having learned the practice of the trade, as we have proved above, it did not s stop at the purest material perfection of execution, and sought the type of beauty. Did it seek this a second hand, according to an academic teaching? No; it composed it by looking around. We shall see that for the sculpture of ornament this school proceeded in the same manner, i.e., it abandoned entirely admitted errors, to resort to nature as a form always vivifying. To learn the trade, to carry it to great perfection by making itself the submissive disciple of a tradition, to gradually leave that guide to study nature materially, they one day to begin the search for the ideal, when its wings are felt to be sufficiently strong, that is what the Greeks did, and what was done by the schools of the 13 th century. The purest and most elevated of those schools, without contradiction, is that of Isle-de-France. That of Champagne follows nearest, t then the Picardy school. As for the Rhenish school, we shall speak of it last, because it indeed developed more slowly.

From the first years of the 13 th century arose the western facade of Notre Dame of Paris. At the death of Philip August, i.e., in 1223, it was built up to above the rose window. Then all sculptures and cutting was finished before setting -- the three portals of that facade were erected in 1220. That on t the right, called that of S. Anne, was rebuilt in great part with the sculptures of the 12 th century, but that on the left

called that of the Virgin, is a complete composition and one of the best of that epoch. [1] It is evident to every careful and unprejudiced observer -- for many artists are fully convinced that this sculpture is without value and have never taken the trouble to examine it.[2] -- That the statuary authors of those numerous figures have entirely abandoned Byzantine traditions, in the conception as in the details and the execution, that they have carefully studied nature, and have attained an ideal belonging to them in particular. Here (Fig. 15) is a head of one of those kings, less than nature, that decorates one of the voussoirs of that portal. Certainly that does resemble the Greek types; this is not the Greek beauty, but not to recognize that in this head are all the conditions of singular beauty, it seems to us, is to deny the light of full day. The moral sense impressed on this face is no longer that generally denoted by the features of Greek statues. This broad and high forehead, those well opened eyes, scarcely sheltered by the arched eyebrows, and thin nose, the mouth delicate and slightly scornful, the long flat cheeks, indicate thoughtful boldness and strong intelligence, aroused on occasion. But th is no longer the portrait of an individual as at Chartres; it is a type that lacks neither nobility nor beauty. We should give too much extent to this Article, if it were necessary fo us to present a great number of these figures, all evidenlty subject to a type of accepted beauty, but which no longer resemble the features of a personage sculptured on the metopes of the Parthenon.

Note 1.p.139. Art. Porte, Fig. 68.

Note 2.p.139. We do not exaggerate. Possessing casts of som heads from this portal, it occurred to us to show them to sculptors in our cabinet. Struck by the beauty if the types and the execution, they asked from whence came these masterpieces If we had been so imprudent as to confess that they were cast from the portal of Notre Dame of Paris, admiration at once v would have fallen int coldness. But if being better advised, we said that those casts came from some monument of Italy, and at the beginning of the 13 th century Italian sculpture was very barbarous -- there would be a revival of enthusiasm. Academic dogmatism not only does not permit the admiration of French works, but it regards it as a very wicked action to

examine them. At least that would be a very bad matter.

If the take up the execution of this statuary, we find its execution broad and simple, almost indiscernible from the beautiful Greek works; this is the same sobriety of means, the same sacrifice of details, the same flexibility and at the s same time the same freshness in the mode of modeling the the nude. Besides these figures are cut in a stone, whose hardne nearly equals that of the marble of Paros. This i from the gypsum, most dense and best selected.

We have described in Art. Porte this statuary, the most remarkable of the portal of Notre Dame of Paris. It is not onl recommended by the noble expression of the heads; from the point of view of composition it emphasizes an art very profo dly studied and felt. The relief of the death of the Virgin is a scene admirably intended for dramatic effect, as well a for the arrangement of the lines. That of the coronation of the mother of Christ, of which we present in Fig. 16 a very insufficient sketch, shows well that those artists knew how to compose, to arrange the lines of a group and to render an action by the movements and by the expression of the pose; t the heads of the two personages are admirably beautiful by th simplicity of the attitudes and the purity of expression. Th is here the case of making an examination. men talk much, wh it is a question of this statuary of the 13 th century, of what is called religious sentiment, and are much disposed to believe that these artists were persons living in the cloisters and all attached to the most rigid religious practices. But without claiming that these artists were lukeward believers, it would still be very strange, for this religious feeling to be manifested in an entirtely remarkable manner in th art of statuary, precisely at the moment when the arts were no longer practised except by laymen and on cathedrals, for the construction of which the bishops refrained from addressing themselves to the religious establishments. It would no be less singular that the art of the statuary, during the entire time that it was confined to the cloisters, produced onl works possessing certain qualities, among which what one cal religious feeling rarely appears, except under a form purely traditional, as the preceding examples can show.

See the truth. While the arts were practised only by monks

tradition ruled, and the tradition was only an inspiration mo more or less near Byzantine art. If the monks made some progress in that state of affairs, this was only by a more or less exact imitation of nature. The diea was dogmatized under certain forms, so to speak; It was a hieratic art tending to free itself by the purely material side. But when art escaped the limits of the cloister to enter the studio of the layman, the latter seixed on it as a means of expressing his long restrained aspirations, his desires and his hopes. Art in the society of the cities became, in the midst of a very imperfect p political condition, -- pardon me the expression, -- a sort of freedom of the press, an issue for minds always ready to reac against the abuses of the feudal state. Civil society saw in art an open record on which it could boldly show its thoughts under the cloak of religion; that this was thoughtful, we do not pretend, but it was an instinct. The instinct that drives a crowd lacking air toward the open door. The bishops, within the rites of the North, that had long manifested a need of fr freeing themselves from the feudal powers, in what they believed the instinct of their domination, actively furthered this development of the arts, without perceiving that the arts being once in lay hands, would become the means of enfranchisement, of intellectual criticism, of which they would soon no longer be masters. If one examines with profound attention [1] this lay sculpture of the 13 th century, and studies it in i its least details, he discerns in it indeed something else t than what is termed religious feeling; what one sees there is before all a pronounced democratic feeling in the manner of treating the given programmes, a hatred of oppression that appears everywhere, and what is more noble and in fact an art worthy of the name, the freeing of the mind from theocratic and feudal swaddling clothes. Consider those heads of the personages that decorate the portals of Notre Dame, and what do you find there? The impression of intelligence, of moral power under all forms. One is thoughtful and severe, another allows a bit of irony to appear in its closed lips. There are the prophets of the lintel of the Virgin, whose meditative and intelligent faces end by embarrassing you like a problem, if you examine them closely and for a certain time. Several a are animated by faith without alloy and have illumined featur

But now longer express a doubt, put a question and meditate o
it? Thus we explain today the scorn and even anger excited in
certain minds by the admiration that we profess for these wor-
ks, especially if we declare them French. At bottom this pro-
test is reasoned. We have long thought -- for every artist h
has a touch of frankness -- that in that opposition to our a
admiration was ignorance of the works, presumptions or preju-
dices that a sincere examination might vanquish at length. We
were entirely mistaken. The matter is that it is unnecessary
for this art to pass as beautiful, and it is unnecessary for
it to be accepted as beautiful, because it is a profound mark
of what can be obtained by the enfranchisement of minds and o
the developments that this freeing can take. A school that is
trained in the cloister in respected traditions, and abruptly
leaves them to demand light from its own intelligence, its re
reason and its examination, to react against secular dogmati-
sm and advance in the course of emancipation in everything!
What a dangerous example that one cannot too strongly oppose!
Every debauch will be permitted to us in matters of art and
taste, rather than admiration for the sole epoch of our hist-
ory in which freed artists have known how to find in architec
ture methods and forms entirely novel, have known how to pro-
duce a school of sculptors neither Greek, Byzantine, Roman no
Italian, nor whatever may have appeared in the field of the
arts since the age of Pericles, who drank from their own well
while turning their eyes from dogmatism in matters of art. F
For whoever pretends to keep in tutelage human intelligence
like a minor induces it to free itself, and it is clear that
such an intellectual precedent in the history of a people mu-
st be presented under the darkest light; that is logical. But
it is more difficult to explain why many persons in France,
devoted to ideas of emancipation and who pretend to protect
its expression, see in those productions of the 13 th century
only a diseased state, stifled beneath an oppressive social
order, only a sign of moral servitude. Servitude to whom? The
do not say. Trample the cold ashes of feudalism and theocracy
if it seems good to you; there is no great danger, for you k
know that they cannot rekindle, but why crush beneath the sam
heel the oppressive system of those, who first knew how to fr
themselves by reacting against the intellectual enervation of

the middle ages? Is that equitable, courageous and clever?

The religious monument was almost the only one where the a artist could express his ideas and fellings, and he did this independently and in bold fashion. He rejects the **hieratism** always attached to a society governed by any despotism, theocratic or monarchic. Whn do you refuse him this part of precursor in the path of emancipation of intelligence?

One can recognize the qualities of an art by considering w who are its detractors. Admiration does not teach much, but the criticism from the sade taken and the place from which it comes are a precious instruction. If you see an entire century rise against an art of the preceding time, you can be a assured that the ideas dominating that vilified art are in manifest contradiction of the ideas of the society that rejects it. If you see a body, association, or coterie of artists reject an art, you can be certain that the qualities of that art are in direct opposition to the methods and the mode of existence of that body. If a school is marked by the mediocrity and dullness of its productions, you can be assured that t the school rejected bitterly by it is distinguished by originality, by seeking progress and examination. In the republic of the arts, what is most feared is not contemporaneous criticism, being always to be suspected of partiality, but the silent protest, cruel and persistent, against an are recommended by qualities that itself does not possess. In a time like the age of Louis XIV, when the artist was scarcely more than a guest of some great lord, pensioned by the king, subject to all caprices of the court, disposed to make all concessions to please, all flatteries to live (for one flatters with the chisel as well as with the pen), it is not surprising that the statuary of the 13 th century must appear barbarous, with its individual and independent character. Place one of those beautiful Etruscan bronzes, of which the British Museum possesses so many, on the fireplace of a lady of fashion, in the midst of Chinese articles, faience, old Sevres, and those trickeries so much sought at the end of the last (18 th) century, and see what a figure is made by the antique bronze? It was natural that the critics of that century, for example who placed the tomb of marshal Saxe on the level of the most beautiful productions of antiquity, should find obtrusive the bold sculptur

of the best times of the middle ages. The clergy itself showed a special animosity in destroying those permanent denouncers of the state of degradation into which art fell. Those with a duty to struggle against the enfeeblement of a society, and who far from having the courage and strength, profiting by t that moral relaxation, habitually attacked all that formed a contrast to that state of decadence into which that society fell. When the chapters of the abbots of the last (18 th) century cast down the art works of the best time of the middle ages, they rendered to those works the only homage, that they were then in condition to render to them; they could not suffer them to be witnesses of the dullness with which religious edifices were then filled. It was the instinctive shame of the man abandoned to debauches, who rails and seeks to desperse t the society of good men. The thoughtful and serious statues of our portals were only good to send bad dreams, to the petty abbes of the salons, or to those canons, who to increase their incomes sold the vicinity of their cathedrals for building b booths. Even today a part of the French clergy only views with mistrust the admiration for the good sculpture of the middle ages. In it are boldnesses, injurious independent tendencies; those stone figures have too thoughtful an air. They love better the saints in a vacuum with theatrical poses, or virgins resembling decent maids, those insipid angels, and all those poverties to which art is nearly a stranger, but which say nothing and compromise nothing. Many respectable personages, -- and placing ourselves at their point of view, we perfectly comprehend the spirit that guides them,-- have only seen with a certain apprehension this archaeological movement that carries minds to study the art of the middle ages so carefully kept under a bushel; they have felt that criticism, entering on that territory of the past, would bring into light an entire series of ideas, that would overthrow several temples; t that of the easy religion erected with so muc care sence the 17 th century; that of the official art, convenient, only allowing one form, rejecting very far all thought, all intellectual labor like a heresy.

All is connected together in a society, and when one examines closely, no fact is isolated. Society that in its midst admits only one powerful company would condemn the human mind to ab-

absolute abandonment of all personality, to blind submission, to a moral direction of which one must not even seek the sense and reason, that society must soon see aries as a corollary, a similar principle in the domain of art, a bitter enemy of all that could indicate individuality, examination, independence of the artist, respect for the art before respect for the dogma that pretends to direct it.

What is always striking in Greek works is that the artist first respects his art. One has the same impression when he examines the good productions of the 13 th century; whether the artist be religious or not matters little to us; but he evidently believes in his art, and he manifests the entire liberty of the believer, whose greatest care is not to lie to his conscience.

We confess that for our part, in every production of art, what affects and attaches us is, that it is nearly as much the imprint of the man that created it, as the intrinsic merit of the object. Greek sculpture charms us so much because we see the artist through his work, that we can follow his tastes a and desires on the marble that he has left, the expression of his will, but when those productions have no merit other than that of execution in a studio, when the artisan is substituted for the artist, weariness seizes on us. What we love above all in the statuary of the middle ages, even the most ordinary, is the individual imprint of the artist nearly always deeply graven on the stone. In the innumerable figures of the 13 th century one finds joys and hopes, the bitterness and deceptions of life. The artist has sculptured as he thought, his mind d directed his chisel; and since for the man it is only a subject always new, he has translated the feelings and passions of man and one will not be surprised in divining the artist behind the work. We are more touched, than if the work were merely a solid enclosing a beautiful form.

There is the question for us in the 19 th century. Must we regard the beautiful according to an accepted canon, or is the beautiful a spirit developing in different ways according to laws as variable as are those of the human mind? From the philosiphical point of view, the reply cannot be doubtful; the beautiful can only be an emanation from a principle and not an appearance of a form. The beautiful is born and lives in the

soul of the artist, and must be translated according to the movements of that soul, that is accustomed to conceive the beautiful and the true. It is not we that say this, but the Greeks. And in this respect we may be allowed to emphasize one of those contradictions among so many others, when it is a question of esthetics. We, modern philosophers and writers and not artists, our artists are anything but philosophers; so that these two expressions of the human mind among us, art and philosophy, each pass on their own side and deceive each other reciprocally, or deceive the public concerning the influence that they can exert on each other. It is evident that Socrates was very sensitive to the beauty of sculpture; he had practised sculpture somewhat. He lived in an atmosphere -- that he never wished to leave, even to escape death -- where the beauty of form seemed to subjugate all minds, and yet so that it expresses itself somewhere.[1] "Philosophy, receiving the soul truly joined, and so to speak, fixed to the body, is forced to consider things not in themselves, but the intermediary of the organs, as if through the walls of a dungeon and in absolute darkness, recognizing that all the strength of the prison comes from passions, that make the prisoner himself tighten his chain; philosophy, I say, receiving the soul in that state, exhorts it gently and seeks to deliver it; and for that shows it that the evidence of the eyes of the body is full of illusions like that of the ears, and that of the other senses; induces it to separate from them as much as possible; counsels it to collect itself and to concentrate in itself, to believe only in itself, after having examined within itself, and with even the essence of its thought what each thing is in its essence, and to hold as false all that it learns from another than itself, all that varies according to the difference of the intermediaries; teaches him that it sees thus that it is the sensible and the visible; that what it sees by itself is intelligible and the material." And before Socrates, did not the poet Epicharmes say:--

"It is the spirit that sees, the spirit that hears;
The eye is blind, the ear is deaf."

Note 1.p.146. Phedo, translated by V. Cousin. Edit. of 1822. Bossonge. Vol. I. p. 243.

Thus those Greeks that are represented to us ,when it is a

question of the arts) as absolutely devoted to the worship of external beauty, of the form, before Phidias possessed in their midst poets and philosophers, who sang and taught what? T The illusion of the senses, the detachment of the soul from the body, from its appetites and passions, the subjection of the external envelope of the mind. One can confess that in t this respect Christianity has invented nothing. But if the Athenians while listening to Socrates cut the marbles of the Parthenon and of the temple of Theseus, they connected with difficulty the theories of the philosopher with that marvellous importance assigned to external beauty. Socrates was condemned to death. Phidias was exiled; which tends to prove that at this moment of Athenian civilization commenced a deaf struggle between those two principles, the dominance of matter o over the soul, of the soul over matter. And in fact Phidias was no sooner at Olympia, than he fashioned that statue of Zeus, of such a singular beauty, if one can believe those that have seen it, because it reflected on an admirable form the most profound thought. Already then at the climax of the splendor in form of Grecian art arose that reaction, not against the beauty of form, but against the supremacy of that beauty over the intelligence, over what Socrates himself calls the truth born of the human soul. Then what have done those statuaries of our fine primitive lay school, if not to follow that path opened by the Greeks themselves, and to seek not by imitation in relief but in their thoughts, all the elements of the art of which they have left such beautiful examples?

The statuaries of the 13 th century could not have the ideas and feelings of the statuaries of the time of Pericles; having other ideas and feelings, it was natural for them to seek for rendering them means different from those employed by the Greek artists, and in that were in accord with the principles stated by the Greeks, if we credit Plato. But on will object: "We do not dispute that, we do not accuse the artists of the middle ages of not having produced works as good as permitted by the social atmosphere in which they lived. We hold to stating only that their works are not and could not be as beautiful as those of the Grecian epoch, and that consequently it is good to study the latter, bad to study the former." We are agreed, except on the conclusion in that it is at least absol

We shall reply:-- "It is useful to study Greek statuary and at the same time to inquire into the social state in the midst of which it developed, because that art is in harmony with that social state, and that its sensible form is perfectly beautiful; but our social condition differing from that of the Greeks, it is useful to know how at other epochs, in new conditions foreign to those of Grecian society, artists have known how to develop an art without imitating the greeks still retaining their own character; because it is always useful to know the sincere means employed by human intelligence to manifest itself." To deny that the social and religious st state of Greece was not the most favorable atmosphere for the development of the arts of form that ever existed, would be t deny the light at full noon; but to pretend that this atmosphere can be the only one, or rather that what it produced mus continually be reproduced, even under other conditions, is to denw the development of the human mind, so much praised by t the Greeks, and to consider aspirations for new horizons as puffs of foolish vanity. We agree that one cannot excel the beauty of form of Greek statuary, and then the conclusion mus be to seek another undeveloped side of beauty. In that sense the efforts of the statuaries of the 13 th century were directed. In their works beauty of form is certainly much below w what Greece has left us; but a new element intervenes, the i intellectual element that the Greeks first aroused. Statuary is no longer only an admirable external form, a sublime material appearance, if becomes a being revealing an entire seri of ideas and feelings. All Grecian statues look in their actual time -- and that is why it is ridiculous to copy them today, when that past is so far away -- while the statues of t the middle ages in the best period manifest an idea, which i that of all humanity and seems to wish to divine an idea, which is that of all humanity and seems to wish to divine the unknown. That caused us to say just now, that many of them e express doubt, not melancholy and discouraged doubt, but bold and investigating doubt; that doubt that altogether leads to the great development of modern society, that doubt which for med Galileo, Pascal, Newton and Descartes. The statuary of th Greeks is the sister of poetry; that of the middle ages penet rates the domain of psychology and of philosophy. Is that a

misfortune? What is to be done? Unless to resolutely take its part and to profit by the fact instead of attempting to conceal it. Are not most of our statuaries a little like scribes amusing themselves by contenually recopying illuminated manuscripts, and refusing to recognize the invention of painting?

But it is unnecessary to believe that those statuaries of t the 13 th century could not, when they desired, express that brilliant and glorious serenity that is the characteristic of faith. At Paris and Rheims a good number of figures are impressed by those feelings of noble beatitude, that the imagination leads to beings superior to humanity. The angels were for them a motive of remarkable compositions, both as the entirety and in the expression od the heads.

One can see on the arches of the principal portal of Notre Dame of Paris two zones of angels at half length, whose poses and expressions have a ravishing grace. The cathedral of Rheims has retained a great number of those representations of s superior beings treated with rare merit. The angels placed on the great buttresses are of colossal dimensions, are nearly all masterly works. Others are of a little earlier epoch, i. e,, must have been sculptured about the year 1225, and that are attached to the angles of the apsidal chapels below the cornice, and have qualities that almost place them on a parallel in execution with the Grecian statuary of the good time. We give (Fig. 17) the head of one of those angels. Antiquity does not express youth better, ingenuousness, calm and safe happiness, and still in those intelligent features is nothing silly or mincing. It is young and graceful, but at the same time is strong and healthy. We shall invite persons, who without ever having glanced at the statuary of the middle ages, except on Flemish chests covered by deformed grotesques or at some diptychs, and see in this art only a development of the ugly, to make a journey to Rheims, Chartres or Amiens, a and to examine with some care the good colossel statues of those churches and the two or three thousand figures of the voussoirs and reliefs; perhaps their judgment would be somewhat modified. [1]

Note 1.p.149. The illustrations added to this Article have all been drawn from sketches made by the camera lucida, from photographs, or from the originals, even by the aid of the

camera lucida. We make this remark because even in good faith some persons have claimed that we give to the statuary of the middle ages a character of beauty, that it does not possess. We cannot accept that flattering criticism. But were it true, it would prove that the study of this sculpture can lead thos devoting themselves to it, to do better while retaining its style and its character, thus this study would not be a bad thing.

If this angel's head is beautiful and intelligent, does tha beauty resemble that of Grecian beauty? Not at all. The forehead is high and broad, the eyes are long, scarcely sunk belo the arched eyebrows, the nose is small, head wide across the temples and the chin is delicate. It is a type of an idealize young man of Champagne, that has nothing in common with the Greek type. In our eyes, that is not a wrong, but a quality. To idealize the elements that one has around him is the true part of the sculptur, rather than to reproduce a hundred time the head of the Venus of Milo, losing from it at each reproduction something of the flower of its original beauty. [2] We have not sufficiently insisted on the conditions in which the beautiful developed among the Athenians of all the Greeks. T However elevated the doctrine of Plato, however marvellous t the Phedo in grandeur and serenity of thought, it evidently results from the arguments of Socrates, that the end of man is himself, the perfecting of his spirit, the detachment of h his soul from material things. There is in the Phedo and particularly in the Crito one of the most beautiful definitions of duty ever made. But it is merely a question of duty to the country; humanity does not enter into the ideas expressed by Socrates. It is for man to rise by seeking wisdom, and by that search he detaches himself as much from his neighbor as from his own body. The search for beauty in the arts, according to the Athenians, proceeded in the same manner; man is sublime but humanity does not exist. That is why so many persons, judging are with their instinct alone, while admiring a Greek statue, reproach it with lack of expression, which is incorrect, but is rather the defect of human feeling, which would be nearer the truth. Every individual statue, the more nearly perfect it is for the Athenian, and the more nearly it approaches the myth man, complete but independent of the rest

of humanity, detached and absolute in its perfection. Thus s see the slope; of the superior man the Greek makes a hero; of the hero a god. Certainly there is a powerful means for attaining beauty, but is it to be said that this may be the only one, and especially that it is applicable to modern societies? That is particularly suited to the Athenians, but not all to Grecian civilization. Discoveries made outside Attica demonstrate that with us men have formed too absolute ideas on Grecian art. The Greeks taken as a whole were far more romantic artists than one is willing to believe. To be convinced of t this, it suffices to visit the British Museum, better supplied with productions of Grecian statuaries than the Museum of the Louvre. What results from that examination is the extreme liberty of the artists. The fragments of the tomb of Mausolus, for example, certainly date from a good time and are very beautiful, more nearly resembling the statuary of Rheims than that of the Parthenon. We are grieved for the classicists, w who have made a little Greek art convenient for their use and that of their proselytes; this is a bad example, but it is re really Greek; and this monument was much prized by the Greeks, since it was regarded as the seventh marvel of the arts. Can we admit that the Greeks did not know it?

Note 2.p.149. On a recent edifice, unnecessary to name, we have counted 22 heads of the Venus of Milo, as many as there are statues. On a remark that we made to a sculptur on this abuse of a masterpiece, he replied to us:-- "Those statues w were so badly paid for\" may be, but then one does not advance the interests of art.

The statue of the king of Caria is almost entirely preserved, including the head; the person strongly recalls one of the st statues of the portal of Rheims, that we give here (Fig. 13), requesting sculptors to go to see it. It is on the left splay of the middle portal. Now when one thinks that this statue of king Mausolus is sixty years later than the statuary of Phidias, one can be assured that Greek statuaries did not recopy, and that they sought new ideas in all ways, without fearing to continually resort to nature as to a vivifying spring. At the British Museum one can see numerous examples of this Grecian statuary from the coasts of Asia Minor, which although impressed by an excellent style differs as much, as the stat-

statuary of the middle ages itself does from the statuary o Attica. If the museums in France were establishments seriou ly devoted to study, and placed outside exclusive systems, there would already have been collored in special halls com arative casts of antique statuary and of the middle ages. N ing would be more suitable to open the intelligence of arti and to show them how art at all epochs always proceeds acco ing to certain identical principles. Would not that be bett and would it not be more liberal than to nourish our youth trivialities and to maintain in them an ignorance, that if matters continue thus, to make us ashamed in Europe? [1] if i the halls where are placed in parallel Greek figures of the Eginetan period and figures of the 12 century of French sta uary, one would be struck by analogies in these two arts, n only in the forms but in the execution. If further one plac under examination figures of the epoch of the Grecian devel ment and of the 1 th century of French, one would see by w numerous points of contact are united those two arts, so di erent in their expressions. But that would tend to emancipa the spirit of artists, and to cause to be recognized, that there was a French art before the 16 th century, two things to be prevented at any price, because that would be the dea of the academoc protectorate in art matters, and that the p tectorate is converient for those who submit to it and cons quently profit by it.

Note 1.p.152. More than ten years since, our beautiful st uary of the 12 th and 13 th centuries was cast to be sent t England, to form comparative museums of the greatest intere from all points of view. At the same time we offered to sen examples of those models, without cost of the casts, to for in Paris a museum of comparative statuary. No reply was mad to that offer.

What is important to maintain is that before the 16 th ce ury, every reproduction of art in France was merely a rude and barbarous experiment. That Italy had to happy destiny t enlighten us, that certain sufficiently skilful artists in France in the 1 th century, under the influence of the cou of Francis I, were refined by contact with Italians and pro uced works that do not lack charm. But that the 17 th centu alone, i.e., that to the academy which is an incarnation of

it was reserved to coordinate all those elements and to form of it a body of doctrine, from which light must shine forever. If one allows to be seen that France possessed an art before that Italian inoculation of the 16 th century, so well regulated by the academy, all that fixed scaffold erected with so much care and by the aid of so many historical falsehoods would crumble, and we should find us in face of ourselves, i.e., of our own works. We should recognize that men have made masterpieces without the Beaux-Arts and without Villa Medicis. As protectors of the arts, we should only have our talent, s study, and our own genius, and our courage. There is no more government possible in art with those elements alone, all is lost for the governors as well as for a good part of the governed, and especially for the class of censors, that have never held the roughing tool, compasses or pencil, but live on art as the ivy lives on the oak, while stifling it under its abundant foliage.

The true may sometimes be improbable!

If one says to those artists, pardon us, those image-makers of the 13 th century:-- "Good people, who make of sculpture what one does nowhere in your time, who form the mother school where men come to study, who send artists everywhere, who practise your art with faith in your works and a perfect knowledge of material means, who cover our country with a world of statues at least equal to the world of statues of Greek cities, there will come a time in France, where you place the centre of your schools, where Frenchmen like yourselves will deny y your merit, -- that matters little to you, -- but they will attempt to make it believed, that you never existed, that your works were not by you, that they are due to a protecting chance, and they will give as proof, that you have not signed your statues. The good men would not have believed the prediction. Yet the prophet would have prophesied well.

We shall not demand more here than to occupy ourselves only with our ancient arts; but it is indeed difficult to avoid p parallels and comparisons, if one pretends to be intelligible. statuary is an art that more than any other possesses the privilege of unity. It is not like painting with resources so varied and infinite, where between the fresco of the catacombs and the painting of the Dutch school are a thousand roads, p

paths, different methods and fifferent ways of employing them. To write the history of the statuary of an epoch is necessarily to enter into all the schools that have appeared. Then let us be kindly pardoned those repeated excursions, both into a antiquity and into our modern statuary. can we make appreciated the quality that we term dramatic in the statuary of the middle ages, without seeking to what point the ancients anticipated it, and what we have made it today?

It is first necessary to explain what we regard as the dramatic element in statuary. It is the means of impressing in t the mind of the spectator, not only the material representation of a personage, myth, act or scene, but an entire order of ideas connected with that representation. Thus a statue o perfectly calm in its pose, even in the expression of its features, may possess dramatic qualities, and a violent scene may have none. A certain antique statue, like the Agrippina of the museum of Naples, for example, (even admitting that no one k knows what personage it represents), is eminently dramatic in the sense, that in its wearied pose, in the entirety of the profoundly sad and pensive figure, one divines the entire baleful history, while the group of Laocoon is very far from affecting the mind and from developing a drama. These are models and the serpents are merely a pretext there to obtain certain effect of pose of the muscles. We especially select those two examples in a period of statuary, where one seeks just that dramatic quality, and where one only obtains it when not seeking it, i.e., in some portraits. Although in statuary beauty of execution may be more necessary than in any other art, yet the dramatic element is not essentially dependent as that execution. A certain relief of the metopes of Selinus, although primitive and rough in execution, a certain sculpture of the 12 th century that presents the same imperfections, are profoundly impressed with the dramatic idea, in that those sculptures transport the mind of the spectator far beyond the restricted field filled by the artist. It is to be stated further, that the dramatic quality in statuary seems to weaken as the perfection of material execution is developed. In the Egyptian monuments of high antiquity, the dramatic impression is often more profound as the execution is ruder.[1]

Note 1.p.155. We do not use the word notoe, that seems to

us to be very badly applied in case of the so-called primitive arts. To sculpture a lion like the Egyptians, suppressing many details, but rendering so much better the imposing charm of that animal, that is not naive; entirely on the contrary, it is the result of a very thoughtful art, very sure of what it did.

In the arts of design and particularly in sculpture, the d dramatic impression is communicated to the spectator, only if it emanates from a simple idea and if that idea be translated, not by the material appearance of the fact, but by a sort of ideal or poetic translation, or by the expression of a parallel feeling, let us say. Thus to give a hero dimensions superior to those of persons that he combats, is to return to the first condition. To give that hero an impassible face during a violent action, is to return to the second. To represent a colossal person shooting arrows from the height of his chariot, hurried onward by horses at a gallop, at a multitude of overthrown and suppliant enemies, is an ideal or poetical translation of a fact; to give the features of this personage an impassible expression, of a sort that he seems to only cast a vague glance at the vanquished, without passion or anger, is to engrave in the mind of the spectator an impression of moral grandeur, that instinctively produces the desired effect

Unfortunately we possess only a very small number of grand compositions of Grecian statuary, and it would be difficult to follow the affiliation of the dramatic in that art. The composition of the pediments of the temple of Egina obtained by means of statues representing a material fact in different poses, has nothing dramatic. But while the feeling of the dramatic is deeply graven in Grecian art from a very high antiquity, if one judges by certain fragments of the temple of Selinus already mentioned, and by the paintings on vases. The dramatic feeling (aside from the truth of the pose) is very developed in the statuary of the Parthenon and of the temple of Theseus, but is developed in the purely material sense. It is much to move one by external beauty, and perhaps that is first of all to be sought by the statuary, but believe us that it is not all. There are other cords that art can cause to vibrate, and the difficulty is to combine in the same subject both the beauty of form, that seizes the mind by the eyes, and that

reflection of a thought, that transports the mind beyond the material representation. Rarely were those two results attained in antiquity; more rarely still in the art of the middle ages. The dramatic sense, often so profound in the statuary of the middle ages, seems to restrict the development of beautiful form and statuary, entirely permeated by its idea, and expresses it without thinking of the beauty of form. It is no less necessary to distinguish those qualities and to take them into account.

Some reliefs of the end of the 12 th century of the school of Isle-de-France are very strongly permeated by dramatic feeling. We will cite among others that on the tympanum of the central portal of the cathedral of Senlis and represents the death of the Virgin, and there the execution is beautiful. In that scene at which the angels are present, there is a thought rendered with masterly grandeur. The event moves the celestials more than the apostles, and in that emotion of the angels, there is an air of triumph that moves the heart, taking from that scene all appearance of an ordinary death. It is no longer the mother of Christ dying in the midst of the apostles that express their grief, if is a soul loosed fro earthly b bonds, and whose coming advent rejoices heaven. In similar s subjects, the idea of placing Christ among the apostles, receiving in his arms the soul of his mother in the form of a child, as already the very dramatic expression of an elevated and touching feeling, and that idea has often been happily rendered by the artists of the beginning of the 13 th century. The Rhenish school also manifests dramatic tendencies from the 12 th century, but with a certain seeking, that presents the defects of that school inclining toward mannerism.

The enclosure of the eastern choir of the cathedral of Bamberg represents under an arcade the apostles grouped in pairs, that emphasize well the tendencies of that Rhenish school, so interesting to study: Fig. 19 gives one of those groups. In t the poses and the expressions of those personages that are d discussing, there is a pronounced dramatic feeling of realism, found at that epoch in no other school. But this dramatic feeling lacks the elevation possessed by the statuary of Isle-de-France. That province is the Attica of the middle ages. To its school it is well to resort when one desires of render account

of the development of statuary, both in idea and in execution.
We have already spoken of the scenes, that ornament the arches of the central portal of Notre Dame of Paris (side of t the damned), and of the terrible expression of those scenes opposed to the blessedness and calmness of the elect. One of the scenes represents a nude woman with bandaged eyes, holding a large cutlass in each hand; she is on horseback and behind her a man falls backward, whose intestines escape from a great wound. See Fig. 20. "And at the same time I saw appear a pale horse; and the one mounted thereon was called death, and hell followed her, and power was given to her over the fourth part of the earth, to slay men with the sword, by famine, by mortality and by wild beasts." [1] The appearance of the four horses of the Apocalypse is rendered on a great number of religious edifices of that epoch, notably on the cathedral of Rheims; but what a difference in the manner of expressing that scene! Here at Notre Dame the artist has given the figure of a woman to the one mentioned on the fourth horse, of death. It seems that she sprang on that horse mentioned by a proud man, and that with the same stroke she has eviscerated that man, whose head drags in the dust. That fashion of interpreting this verse of the Apocalypse, of translating it into sculpture, the pose of death, whose legs closely hug the horse, t the last movement of the man, the frightened expression of t the head of the animal, and the composition of the lines of this group, present a terrible anxiety. It is difficult to go farther in dramatic expression. Even the execution has something striking and rude, that harmonizes with the subject. The head of the animal and that of the inverted man are remarkable works of sculpture, of which our Fig. can give only a very imperfect idea; one again finds this dramatic feeling in a great number of reliefs of the same epoch, i.e., in the first half of the 13 th century. The prophecies and the vices of the portal of the cathedral of Amiens, the reliefs of the porches of Notre Dame of Chartres, possess these qualtites i independent of the material execution, which is sometimes defective. Thus like the Greeks they often attain true grandeur; for it must be fully recognized that sculpture does not possess the extended resources of painting, particularly as understood since the 16 th century. it has neither the prestige of effects

obtained by perspective, the coloring and the difference in planes. To express dramatic feeling, it has only the pose and composition of the figures. The penury of those means compels great distinctness in the composition. Then one must recognize that the artists of the 13 th century possessed those qualities in a very high degree.

Note 1.p.157. Apocolypse of S. John. Chopter VI, 8.

Yet it is unnecessary to believe that in their works the material execution does not assume a great place. It does not mean here that mechanical perfection, that consists in skilfully cutting and chiseling stone, marbel or wood; they have proved that in that respect, they yield to no school, including those of antiquity; but it concerns that execution so rarely understood in our days, and that belongs to the object, its place and its purpose. The sculpturs of the middle ages composed very small and colossal reliefs. If the refer to the beautiful antiquity of Greece, we observe that the infinitely little things in sculpture are treated like the works of dimensions larger than nature. The procedures adopted for a figure 3/8 or 3/4 inch high on a Greek intaglio are the same as those applied to a colossal figure. Indeed to make a colossal figure appear great, it is not sufficient to give it dimensions beyond nature; it is necessary to sacrifice many details, exaggerate the masses and emphasize certain parts. It is the same if one seeks the infinitely small. The scale then compels you to sacrifice the details, and to accent the principal masses. Thus engraved Greek stones give the idea of a great thing; and if one wished to make a giant with one of those figures 3/4 inch high, he would only have to enlarge it by accurately following the procedures of the artist. The Egyptians in high antiquity before the Ptolemies understood that law better than any other people; their colossal figures, of which they were sparing, are treated according to their dimensions; i.e., the larger they are and the more details are sacrificed, the more the salient points of the general form are felt and accented. Thus those Egyptian giants appear even larger than they really are, while the great statues that we make today rarely give the idea of more than natural dimensions.

The artists of the first half of the 13 th century sculptured a number of colossal figures, and in this observed that law

so well practised in antiquity, of making the execution simple as the object is larger, and of insisting on certain parts th that it was necessary to make prominent.

For example, see how are treated the colossal statues of the gallery of the kings of the cathedral of Amiens. Most of those statues are quite mediocre, but all produce the effect of large size by the manner in which they are treated; some of them are very good. The draperies are extremely simple, the details are sacrificed, but the movement is clearly marked, even accented by the aid of distortions of the real form. Further, all in execution are treated in view of the places occupied by t these statues placed 98.0 ft. above the ground. Let us take the head of one of those colossal figures (Fig. 21); one notes how the features are cut in view of the height at which are placed those statues. The eye is deeply detached from the root of the nose as in certain colossal figures of upper Egypt. The nose is boldly cut with an exaggeration of the projection at the root. The junction of the forehead with the eyebrows is strong; the mouth is cut distinctly; the hair is treated in well detached great masses; the jaws are flattened below t the cheek bones to allow the light to accent strongly the salient points of the face. The same procedures are employed for the draperies and for the nudes; sacrifice of details, simplicity of means, exaggeration of the parts that can emphasize t the skeleton of the figure. Very frequently one sees on the monuments of the first half of the 13 th century statues, that produce an excellent effect in their places, and are defective when placed in a museum. The contrary too frquently occurs today; statues satisfactory in the studio of the artist a are defective when once in place. The question is limited to knowing if it be proper to make statuary for the satisfaction of the artist and some friends, who see it in the studio, or if it be preferable in the execution to think of its final p place. The sculptors of the middle ages had no annual exhibitions to which they sent their works to show them isolated, u under a view not that of the definite view. They first of all thought of the destination of the figures that they sculptured, of the effect that they must produce because of that destination. Thus they permitted irregularities or exaggerations fully justified by the effect in place, but which would cause

them to be condemned in an exhibition hall today.

In our opinion, the exhibition of a statue outside the place for which it is intended is a snare for the artist. Either he works for that isolated and partial exhibition, and then he takes no account of the place, the definite surroundings; or he satisfies the latter conditions and cannot please the amateurs, who go to see his statue just as one looks at a piece of furniture or an utensil, whose place is not indicated. One can produce a charming work in statuary, possessing its value in itself, and some of our modern statuaries have proved that this is still possible today. But for statuary applied to architecture, there are special conditions that must be satisfied, conditions of effect and location, frequently opposed to those that can fully satisfy in the studio. Now the sculptors of the middle ages had acquired great experience of those effects by reason of the place and surroundings, height and actual or relative dimensions. One can even sustain that in this respect those statuaries of the middle ages went far beyond the Greeks, both because they placed on the edifices a much larger number of figures, and those edifices being of incomparably greater dimensions, they must take into account these dimensions, when it was necessary to produce certain effects, that distance and perspective tended to destroy.

For example, it is evident that the Fates of the pediment of the Parthenon, those incomparable statues, were made far more to be seen in a studio than on the cornice of the temple of Mineeva. In that place most of the details were only seen by swallows, and the seated figures were almost entirely masked by the projection of the cornice. In the same monument the reliefs of the frieze under the portico were lighted by r reflection, and could be appreciated with difficulty, although the sculptor evidently thought of their lighting, by the manner in which the figures are treated. But in dimensions, what is the Parthenon compared to the cathedral of Rheims? In the last edifice one can more particularly establish the experimental science of the statuaries of the middle ages. The statues that decorate the great pinnacles of the buttresses and are over 13 ft. high produce a completely satisfying effect, seen from below; if we examine them closely, all have arms too short, necks are too long, shoulders are low and legs

are short, the top of the head is developed in width and heig
Yet the most ordinary practice of perspective makes one recog-
nize that those defects are calculated for obtaining a satis-
fying effect from the point at which one can see those statu-
es. One can give geometrically the rules that must be observed
by statuaries in such cases; this is a matter of experience a
and tact, for these rules are frequently modified, for example
when the statues are enclosed, are detached on light or dark
backgrounds, on a wall or the sky, whether isolated or accom-
panied by other figures. If it is not for us to scorn the wor-
ks of those masters, who have known how to acquire such a per-
fect knowledge of the effects of monumental statuary, and who
have produced so much in such different ways.

Men admitted that the statuaries of the middle ages only k
knew how to make elongated figures, a sort of hermes figures
draped in organ pipes, thin bodies without life or movement,
terminated by heads with an ascetic and sickly expression.

One day after a critic had seen the long figures of the 12
th century of Notre Dame of Chartres, he made some phrases on
this theme, and the multitude repeated them, for we observe
in the matter of appreciation of works of art, nothing is more
convenient than those ready made opinions, that dispense with
inquiries made by one's self, that examination which should
not demand more than one hour. We have already given in this
Article a sufficiently great number of examples of statues,
that nowise resemble hermes figures, and whose heads have an-
ything but an ecstatic or sickly expression. That the artists
of the middle ages sought to make predominate the expression,
the moral sentiment over the form in relief, is not doubtful
and in great part constitutes their originality, but this mora
sentiment impressed on the faces, in the poses, is rather en-
ergetic than weak, rather independent and firm than humble or
contrite. For example, one cannot deny that the statues which
decorate the facade of the house of the Musicians at Rheims,[1]
very natural statues, have all the life contained in such sub-
jects. The harpist (Fig. 22) by his pose, the delicate expres-
sion of his features, the charming simplicity of the clothing,
is very far from that ordinary type attributed to the statuary
of the 13 th century. And with regard to that statue placed
20 to 23 ft. above the pavement of the narrow street, we note

how the sculptor has taken into account the place. Viewed o
its leve, this figure has the body too much developed for t
legs, but from the street, because of the small recession,
legs assume importance and the body diminishes, so well tha
the whole is perfectly in proportion. And this is not the r
sult of the unskilfulness or of the ignorance of the artist
all the figures seated on that facade are in the same condi
ion. Likewise one can observe that statues placed several y
ds above the ground on monuments of the middle ages have re
tively short arms and rarely reduce the length of the body.
That was one means of giving size to the figures and grace
to the movements. Vestris, the celebrated dancer, said that
ten years of her life were spent in shortening her arms. In
eed, the arms are sometimes as troublesome in statuary as i
a salon. Most antique statues have come to us without those
upper members; thus they have an advantage in escaping crit
cism for that part, but those provided with them very clea
show that the Greek statuaries did not commit the fault of
disguising the length of the arms of man, either by artific
by shortening, or a reduction of the actual dimensions.

Note 1.p.162. Art. Moison. Fig. 11.

But there is one quality in the good statuary of the mid
ages, which cannot be taken into account too much. It is th
consisting in well distributing the light over compositions
or isolated figures to obtain an effect, a balancing of the
masses. Grecian sculptors of the good period possessed that
quality; they knew how to make sacrifices to give value to
tain luminous surfaces; they arranged the movements of thei
figures to always leave the larger parts lighted. Indeed in
monumental sculpture, it is necessary to rest the eye of th
spectator on simple and luminous masses, to seize a subject
or the movement of a figure at a great distance. If the exa
ne the reliefs or the statues of our school of the 13 th ce
tury, we shall observe that in the midst of the richest fac
de, if one be distant from the monument, those reliefs or s
atues appear distinctly. It has been claimed that the sculp
ors of the middle ages did not know how to make reliefs, an
that they always employed the round. That is not correct. L
the Greeks, when the statuary could only be seen at a great
distance, they proceeded indeed by the juxtaposition of sta

just as Phidias did for the pediments of the Parthenon, but when those subjects were placed near the eye, they did not fa to adopt the method of relief with all its artifices. At Notr Dame of Paris one sees on the substructures of the portals of the western facade very characteristic and very skilfully com posed reliefs. Those placed in the tympanum of the arch of t the portal of the Virgin, among others, are of charming exec- ution and in the best style. One of those reliefs that we giv here (Fig. 23), and which represents the archangel S. Michel destroying the dragon, has all the qualities of the best stat uary. Excellent composition of lines, balance of masses, move ment well felt and expressed, sobriety of means, nobility of style. This composition can rival the beautiful works of ant- iquity. This figure has nothing of the archaic stiffness, t that is so freely attributed to the statuary of the middle a ages; it is neither thin nor enveloped by those folds like organ pipes. But no more than in Grecian statuary can one fi- nd there those theatrical gestures, awkward movements or acad emic poses, to which we are accustomed, and that too frequent ly we accept for action and energy. Now all the reliefs of th that arch are of value and date from the first years of the 1 th century. We shall find again later those same qualities in the reliefs with a style less broad, but with a more refined observation of nature. Witness these of the southern portal of the same church, that represent episodes of the lives of students of the University of Paris, and which are real mas- terpieces; those of the portals of the cathedral of Auxerre (S. Etienne), that in spite of mutilations suffered, allow us still to see charming compositions, well handled as relie- fs and in a style entirely remarkable, as one can judge at once.

Yet as always happens in a school of statuary already devel- oped, one is inclined to adopt a canon of beauty. This canon that was far from having the value of those adopted by the a artists of the best Grecian antiquity, but had one merit, tht it belonged to us; it was based on the observation of French types, and possessed its native originality. Thus it is easy to recognize at first sight a statue belonging to the school of Isle-de-France of the middle of the 13 th century among a thousand others. Those types have a charm; their exact obser-

observation, after all, gives results superior to those, t
can be produced by the second hand imitation of a physical
nature, which has become foreign to us. We have already st
ed; the beautiful is happily not restricted to a certain f
Nature has known how to distribute the beautiful everywher
it is for the artist to distinguish it from the common, to
extract it by a sort of intellectual operation of refining
from the midst of coarse and degenerate elements, where it
ists in a divided state. Greek statuaries have done nothin
else, but though the Venus of Milo is beautiful one canno
admit that all women are ugly that do not resemble the Ven
of Milo. The beautiful, far from being restricted to a cer
in form, appears in every creation in a harmony and balanc
that does not essentially depend on the form. There occurs
all of us before a true pose, to be strongly affected by a
certain connection in fact between the feeling of the pers
and her external appearance. To render this harmony betwee
the mind and its envelope, the beautiful school of the mid
ages is particularly attached. In the lines of the face, a
in the forms and movements of the body, one finds the indi
ual moral. Every statue possesses its personal character,
remains engraved in the mind like the memory of a living b
that one has known. It is understood that we speak here on
of works having a value from the point of view of art, wor
that are further numerous. A great part of the statues of
porches of Notre Dame of Chartres, of the portals of the c
edrals of Amiens and of Rheims possess those individual qu
ties, and this explains why those statues produce on the m
itude such a vivid impression, so much so that it names th
knows them and attaches to each of them an idea, and frequ
ly even a legend. Among others, such is the beautiful stat
of the Virgin of the north transept of Notre Dame of Paris
In attitude, composition, treatment of draperies, that fig
is a model of true nobleness; in expression the head revea
a firm and sure intelligence, a delicate pride, qualities
moral greatness, that cast into the background of art that
pretended religious statuary with which our churches are f
led today; poor figures with conventional poses, an expres
on of sweet insipidity, seeking prettiness for a little pa
or church.

The statuary meriting the name of art has withdrawn from our temples, as a result of the tendencies of the French clergy s since the 17 th century. Therefore it is no more to permeate the minds of believers with those boldnesses sometimes rude i in art, with that youthful freshness of works impressed by pas sions or strong feelings, but on the contrary to make them s supple by a mild system easy to follow.

This Virgin of the portal of the north transept of Notre D Dame of Paris, the head of which is given (Fig. 24) is a woma of a good house, a noble lady with energy tempered by the ref-inement of the features, set off by that delicately modelled figure. Certainly nothing in that head recalls Grecian statu-ary as a type. It is a face entirely French, and breathes fr-eedom, hardy grace and clear judgment. The unknown author of this statue saw clearly and well, knew how to use what he saw, and sought his ideal in his surroundings. Besides, a skilful practioner, -- for nothing exeels the execution of the good figures of that period,-- his decile chisel knew the refinemen of the wisest modeling.

However powerless may be wood engraving to render these re-finements, yet we hope that this very imperfect copy will ind-uce statuaries to glance at the original in passing.

We find all those qualities in the reliefs of the south por-tal of Notre Dame of Paris, which represents the legend of S. Etienne, and which dates from the same epoch (1257). The com-position and execution of these reliefs place them among the best works of the middle of the 13 th century.

It is necessary to cite also among the good works in statu-ary of the middle of the 13 th century some tomb figures of the abbey church of S. Denis,[1] and of Royaumont; the apostles of the S. Chapelle of the palace at Paris; certain statues of the western portal of Notre Dame of Rheims and of the porches of Notre Dame of Chartres.[2] But it results from that examina-tion, that then under the reign of S. Louis the best school of statuary was that of Isle-de-France. One does not find medioc-re figures in the statuary of Notre Dame of Paris, while at Amiens, Chartres and Rheims, in the midst of figures of excel-lence one finds some that are very inferior, both in style and in execution. Particularly at Rheims, the splays of the north portal are decorated by statues in the worst work, except two

or three that are good. The scuool of Isle-de-France was then at the head, and the city of Paris was the capital of intellectual works and of art, as it already was the political capital. That is not to say that the other schools did not have their own value; the school of Champagne, the Picardy and Burgundian schools then had a fine career, possessing their special characters. The Rhenish school, that already in the 12 th century shone vividly, distinguished itself among the preceding by a pronounced tendency to mannerism, exaggeration and research. Less permeated by the ideal of beauty, it inclined to realism, often near ugliness. That disposition of the Rhenish school has had a bad influence on the opinions that one has formed on the statuary of the middle ages. Since we are naturally induced in France to regard works of art according to the distance that they are from our centre, many persons that have never seen the statuary of the cathedrals of Paris, Amiens or Chartres, not wishing to lose their cost of traveling, have examined with some care the statuary of Strasburg and Freyburg. Only having seen those, they have concluded that the statuary of the middle ages tended to a search for the ugly, or at least was mannered, lean and without grandeur. Yet that judgment i rash, even on the banks of the Rhine. Some statues of the cathedral of Strasburg are capital works; the two statues of the Church and of the Synagogue placed at the south portal, and which are of the beginniug of the 13 th century, are remarkably beautiful. Several statues of the wise and follish virgins of the right doorway of the western facade dating from the end of the 13 th century are masterpieces. One can judge of them by the example that we give here (Fig. 25). Those statues of natural size cut in red sandstone are excellent in execution, and most have a very beautiful figure Those Rhenish artists, like their colleaugues of Isle-de-France Champagne, Burgundy and Picardy, are further inspired by types that they had under their eyes. These are no longer the faces that we find at Paris, Rheims or Amiens, but indeed of Alsatian type. Unfortunately many of those statues or reliefs of the cathedral of Strasburg have been restored at different times, for men have never ceased to work on that edifice. A statue or relief having deteriorated by time or the hand of man, it was replaced. Thus it is unnecessary to refer to the

whole of the examples shown by that cathedral, to form a judgment on the school of sculptors of the 13 th and 14 th centuries, but to determine among these successive restorations t the works that actually belong to that best moment of that s school.

Note 1.p.188. See Recueil de photographies d'apres les monuments de l'eglise abbatiale de S. Denis, published by M.Ficho

Note 2.p.188. See Monographie de la cathedrale de Chartres, published by Lassus under the auspices of the minister of public instruction.

How many times have critics, unfamiliar with the practice of art, established judgments, theories or systems, on works of sculpture, that are only weak copies or unskilful imitations. It is with statuary of the middle ages as with the Greek statuary; many works are badly restored or remade, many are copies that are not to be confounded with the original works. How m many amateurs go into ecstasies over false antiques, assuming them to be of good quality! How many others place to the account of the art of the middle ages the coarse defects and bad imitations, and thus judge an entire school from one example due to some unskilful chisel, to some poor ignorant workman. There is a quality in the statuary of the middle ages in the good time, which always makes itself recognized, even in works of the second order, which is the firmness of the modeling, t the simplicity of the means, the refined observation of the pose, of the features, of the fall of the draperies. This quality is acquired only after long studies, and thus it is not found in imitations, especially when those were made by artists, who pretend to find in that art only a rude simplicity, work less skilfully than they can, assuming thus to approach the simplicity of that art. Simplicity only in appearance, f for when one studies the works of the statuary of the middle ages, he soon recognizes that those image-makers are anything but simple. That simplicity is attained in all arts and especially in sculpture only after long practice, long experience and a scrupulous observation of definite principles. Let us not forget that in the affairs of life, simplicity is the mark of sure taste, af a correct and cultivated spirit; it is the same in the practice of the arts, and we shall never be persuaded that artists who conceived and executed the good statues

of our 13 th century, remarkable by the distinction and simplicity of their bearing, their features and their adjustment, were poor devils, ignorant, superstitious and coarse. As much as the man is worth, so much is worth the work of art that he brings to light; and from a petty mind or a vulgar character will issue only a bad work. To form artists, first form the men. That the French artists of the middle ages very rarely signed their works does not prove that they were merely poor and obedient machines; it proves only that they thought, and not without some basis, that a name at the base of a statue would add nothing to its real value in the eyes of men of taste; they had no need of a certificate or a title to judge work. In that they were simple, like the men that count more on their good bearing and manner of presenting themselves to be well received everywhere, than on the decorations with which they could ornament their button-holes. We have chaanged all that today in imitation of the Italians, of all the great drummers of reputations, it is the attachment of the name of the artist, made a celebrity by right or wrong, that gives value to the work. But what has art gained thereby?

Some desire to see in that scarcity of names of artists on our statuary a mark of Christian humility; but the works of art on which one finds most names are Romanesque works due to monkish artists, or on quite mediocre works. How then could the best artists and the lay artists have shown more Christian humility than the monks and the poor image-makers of small cities? No, those conscientious artists of the 13 th century saw in the art work, art and no their person, or rather their personality passed into their works. They were perhaps animated by thinking that posterity for centuries would admire their statues, and had not the vanity to believe, that they would c care to know if these that sculptured them were named James or William.

Besides, what did they desire? To compete in an entirety; neither the sculptor, painter nor glass-painter separated himself from the edifice. They were not men to regard their statue, their glass or their painting as independent of the monument to which were attached those works. They regarded these as parts of the whole, a sort of choir in which each one strove not to sing louder or on a key differing from his neighbor, but to pr duce a harmonious and complete entirety. But we shall

explain later the motives of that absence of names on the works of art of the 13 th century.

We have scarcely given up to the present time more than isolated examples taken from those great entireties, in order to make their absolute value appreciated. It is time to show how statuary was united to its sister architecture in those edifices of the middle ages. In the 13 th century was that union most intimate, and that is not one of the least merits of the art of that epoch.

In the monuments of Greek antiquity, that retain traces of the statuary that decorated them, these were not absolutely united with the architecture. The architecture enclosed them, left certain places for them, but did not mix with them. Those are the metopes, friezes and entablatures, tympanums and pediments, crownings or endings, taken between mouldings forming around them a sort of setting. Romanesque architecture was mor sumptuous and further left on its edifices niches for statues, wide spaces for reliefs, for example, as on arches of triumph. But rigorously, those sculptures might disappear without the general appearance of the monument losing its value.

The alliance between the two arts is indeed more intimate in the middle ages. For example, it would not be possible to remove the statuary from the porches of the cathedral of Chartres without suppressing the architecture by the same stroke. In portals like those of Paris, Amiens and Rheims, it would be difficult to know where ended the work of the architect, a and where began the work of the statuary and the sculptor of ornaments. This principle is even found again in the details. Thus if one composes a rich base beneath the rows of statues of a portal (which themselves adhere to columns, and so to speak, combine with them); this base will be like a brilliant tapestry, the geometrical compartments of the architecture, or ornamental sculpture and the statuary will be connected t together like a fabric from the same hand. Thus are composed the bases of the great portal of Notre Dame of Amiens, such are those of the great splays of the old cathedral of Auxerre, which date from the end of the 13 th century, and also of many others that it would be too long to enumerate. Among those bases, those of Auxerre are most remarkable. The subjects sculptured are takin from the Old and New Testaments. One sees the

the creation, the story of Joseph, the parable of the prodigal son. These are reliefs with small projection, very skilfully arranged in a geometrical network of mouldings and ornaments. The general appearance with the little relief is solid, brilliant and strongly felt; the subjects are treated with unequaled energy.

Fig. 26 is a fragment of the diapered base representing the story of the prodigal son. In the compartments [1] with 4 lobes, one sees the prodigal son in the midst of women, bathing and banqueting. Medallion 26 is the morality of those secular pastimes. A woman suckles two dragons. That figure is scarcely 1.3 ft. high, is in a charming style with excellent execution; her head is somewhat mutilated by children, like all those re reliefs of bases, that until now was allowed with perfect indifference, although there were laws punishing the mutilation of public edifices. [1]

Note 1.p.173. This fact of vandalism tolerated by the police of cities does not prevent some cities from having archaeological societies that read many memoirs, which freely preach o opposition to the restorations, that they do not direct at t their pleasure. Would they not do better to secure from their city officials or police a little more attentive to those continual mutilations of unique monuments of great value? Of two cities, which is barbarous from the point of view of arts? T That which knew how to inspire those sculptures, or that which allows them to be destroyed by some mischievous idlers?

But just now we spoke of the porches of the cathedral of Ch Chartres as combining in the most intimate manner architecture and sculpture. Indeed, the piers that support the arches of those porches belong rather to statuary than to architectural forms. The north porch presents one of the most complete examples of this intimate alliance of the two arts. It suffices to recognize this by examining the monograph of that cathedral o published by Lassus and the plates of the work of M. Gailhabaud. [1] The supports of the statues, those of the columns serving them as backs, form an entirety with a most happy outline, whose details are in the best style. The originality of those compositions, that date from 1230 to 1240 is the more remarkable, that in this epoch the masters of works already s seduced by some geometrical combinations, tended to restrict

the field of statuary.

Note 1.p.174. Architecture du Ve au XVII siecle et les arts qui en derpendent. Vol. I. South porch of the cathedral church of Chartres and the details.

From the first years of the 13 th century, there occurred in the art of ornamental sculpture a revolution that otherwise tended to facilitate the alliance of statuary with architecture. Ornamental sculpture then served as connection, is a natural transition between geometrical forms and those of the human figure, in that already it had recourse to the flora of t the forests and fields to find its motives, instead of adhering to the traditions of Roman and Byzantine arts. It is here necessary to return a little to make known through what phases the different French schools caused ornamental sculpture to pass, while occupying themselves in developing the statuary. Until in the 11 th century with rare exceptions, such as those presented in Fig. 11, the sculpture of ornament seproduced in a barbaric and unskilful manner the remains of Gallo-Roman s sculpture. We have only indicated the influences due to the V Visigoths, Burgundians, and Scandinavians (Normans), because it is difficult to appreciate the extent and importance of t those influences for lack of sufficiently numerous monuments. But at the time of the first crusades, ornamental sculpture d developed, as we have already stated, with an abundance such that soon the oriental models serving as starting points were surpassed in variety and in execution. Those models were found by the western crusaders in the cities of central Syria and at Constantinople. But that Greco-Roman sculpture is flat, sl slightly undercut.and a little lean, its composition sins by monotony. This is a conventional art that borrowed very little from nature. The beautiful work on the churches of Constantinople by M. Salzenberg, [2] and the Recueil d'architecture l civile et religieuse de la Syrie centrale, published by count Melchior de Vogue with drawings by M. Duthoit, [3] show us sufficiently, that already in the 5 th century, there existed in all that part of the Orient, visited later by the crusaders, a quantity of monuments on which ornamental sculpture assumes a particular character, evidently starting from antique Grecian art, but profoundly modified by Roman and Asian influences. Thus in his introduction count Melchior de Vogue, recognizing

how much an art of the 12 th century approaches that Greco-Roman .rt of Syria, ends with this passage:- "While in the Orient art feeling was gradually extinguished under the rude pressure of the barbarians, in the Orient and at least in Syria existed the intelligent school that maintained good traditions and revived the by happy innovations. Within what limits was exerted the influence of that school? In what measure did its teaching or examples contribute to the western renaissance of the 11 th century? Finally, what part had the Byzantine-Orient in the formation of our French art of the middle ages?

Note 2.p.174. Alt-Christliche Baudenkmale von Constantinopel. Berlin. 1854.

Note 3.p.174. Paris. Noble & Baudry. 1865.

Count Melchior de Vogue furnishes a part of the documents n necessary for the solution of these questions, in what concerns architecture and sculpture. These consist only of ornamentation always skilfully composed, but dry and flat; the human figure and animals are absolutely lacking, save two or three examples, a lamb and peacocks very naively treated. They are almost always toothed leaves, strongly divided, grooved in and on the surfaces so as to obtain a series of shadows and lights without modeling. From the 5 th to the 6 th centuries, this sort of ornamentation scarcely varies. With that ornamentation borrowed from an entirely conventional flora is sometimes mixed -- especially on the edefices most distant from the fall of paganism -- geometrical combinations, interlacings obtained by intersections of circles or of right lines at certain angles. On examining those pretty monuments, so skilfully understood in construction, so wisely conceived in view of the need and of the use of the materials, always in happy proportions, which present such a great number of original arrangements, one is surprised to find in the ornamentation that dryness, that lack of imagination, and that poverty of resources. The churches, monasteries, villas, baths and houses, that witness a very perfect state of civilization, present nearly the same ornamentation during the space of three centuries, and t that ornamentation does not rise above a trade. It is merely a pattern traced on the stone sunk a few 16 ths inch in the intervals of leaves or sprays, fruits or rosettes, and uniformly modeled by the aid of this abrupt hollow by the chisel. F

Further the old sculptures of the church of S. Sophia present the same execution with a little more care in the details. The western artists after the first crusades were evidently inspired by this art. We have shown in Art. Profil how they copy the mouldings, but do not limit themselves to that borrowing, they also take the procedures of construction, arrangements of details and that dry and divided ornamentation. But those western artists do not have the same tastes or the same aptitudes. They are of Provence, Languedoc, Poitou, Burgundy, Normandy, Auvergne and Berry. Going to the school of art of Syria, they saw these monuments through very impoverished traditions, but still sufficiently vivid, that when they returned home, the translations to which they were devoted assumed different characters. Some like the Provencals, copied almost li literally that ornamentation of the Syrian edifices and placed it beside Gallo-Roman ornaments; others like the Normans were inclined to choose in these decorations the geometrical combinations; still others as in Burgundy made a mixture of those Syrian ornaments and those of the Gallo-Romans, left on the soil. Those of Poitou in imitating them gave them a particular amplitude. But all those schools without exception soon mingled the figure with these imitations of Byzantine ornaments. That belonged to the western genius of that epoch; and however rude were those first attempts, they did not delay to develop in an entirely remarkable manner. Italy was far more Byzantinized, and only later reached those ornamental compositions in which the figure plays an important part.

Then let us see how the principal French schools proceeded, when they took as starting point the arts of the Orient after the rude experiments of the 10 th and 11 th centuries.

In Provence was first apparent the imitation of Byzantine ornament, although but partial. There is a certain edifice of that province whose bands, friezes, and even capitals might a appear on one of those buildings of central Syria. To assure one of this, he only needs to consult the work of V. Revoil published on the architecture of the South of France.[1] We give here even a striking example (Fig. 27) taken from a cornice of the little church of S. Croix at Montmajour near Arles. In a great number of monuments of the 12 th century in Provence, beside an ornament evidently copied from the Roman

Greek sculpture of Syria, is developed a frieze and placed a capital, that one might believe to be borrowed from some Gallo-Roman ruin. This mixture of the two arts, or rather of two branches of Roman art, one of which was developed in Gaul and the other in Syria under Grecian influences, on the whole gives only a mediocre art, without character or originality. T That is not the brilliant side of the Provencal architecture of the 12 th century. Ornamental sculpture does not assume a free charm between two influences equally powerful. The cloister of S. Trophime of Arles and of Montmajour; the churches of S. Gabriel near Tarascon; of S. Gilles and of Thor near Av Avignon, present in their ornamental sculpture this mixed and hesitant charcater, reminiscences of two arts sprung from the same trunk, it is true, but being separately developed, could no longer become allied, and that attract the eye by that diversity of styles. One can fuse togethe two arts of different origins or an ancient art with new principles, but when two branches of the same art, when one pretends to unite them, j join badly and leave in the mind the feeling of an unfinished thing, or at least are produced by isolated artists, surprised to find their works mingled.

Note 1.p.178. Architecture romane du midi de la France, by H. Revoil. Architect. paris. Morel. 1864.

Entirely different is the school of Toulouse; that frankly abandons in the 12 th century the imitation of Gallo-Roman o ornamental sculpture; but in becoming inspired by Byzantine art, in borrowing its boldness, its general combinations and compositions, it retains a local character, very similar to that of the civilizations that extended in Languedoc at the fall of the Roman empire. The school emancipated itself and produced works very superior to those of the Provencal school. It must be recognized that independently of its own character, the school of Toulouse is not in direct contact with the Orient; what inspires it is less the monuments of Syria or of Constantinople, that the view of objects brought from the Levant; ivories, carved wood, objects of jewelry and fabrics; all is good for it and becomes a motive of sculptured ornament. The Byzantines represent in their monumental sculpture neither animals nor human figures; on the contrary, their fabrics are amply filled; many ornaments of the school of Toulouse repro-

reproduce in the midst of interlaced branches animals facing each other, or repeated on a frieze as they are repeated on l lace made in the trade. The museum of Toulouse is full of those bands strongly resembling Byzantine laces, with a very remarkabla delicacy of execution ind with those rectilinear or curvilinear interlacings, those beaded scrolls borrowed from small objects brought from the Orient, and also from local g genius, that by the immigrations of the Visigoths, indeed has some relations with those of the Indo-European peoples of the North. Figs. 28, 28 bis and 28 ter give examples of those ornaments, where the Byzantine is mixed wit that are which our English neighbors call Saxon, and of which we shall soon have occasion to speak.

But where the school of ornaments of Toulouse displays particular genius is in the composition of those capitals whose general form and treatment are borrowed from the Gallo-Roman Corinthian capital, and whose details recall with a delicacy of modeling better felt, certain ornaments so common in Byzantine sculpture;[1] it is even more in those compositions filled with original vigor, where the twisted foliage, scrolls and a animals are entangled in a sort of rage, are strongly relieved, then forming brilliant reliefs and vivid shadows with great effect, Byzantine jewelry presents a great number of this sort of compositions; but its execution is heavy, soft and u uniform, while the school of Toulouse knows how to render it exact, even sometimes carried to violence. Witness this capital from the western portal of S. Sernin (Fig. 29), on which are interlaced animals of an appearance so ferocious and strange. All imperfect as that art is, after the soft sculptures of Provence, its energy charms and attracts the attention; it is the expression of a people seeking new paths, hoping to free themselves from degenerate traditions. This ornamentation of the school of Toulouse of the 12 th century is preoccupied, makes itself seen and indicates study, while that of Provence is seductive at first sight, but when one desires to analyze it, only presents a collection of common patterns, changed by a long series of imitations or by the indifference of the work man. A people depicts itself in its sculpture, when that has not been imposed on it by habit or by a false and pretended classical taste. Nothing can better express the character

of this people of Toulouse, that knew how no resist with so much energy the armies of Simon de Montfort, than those numerous art objects still seen in the capital of Languedoc, or in some surrounding cities, like Moissac, S. Antonin and Carcasson

Note 1.p.178. Art. Chapiteau. Fig. 18.

The last city possesses sculptures in the old cathedral of S. Nazaire, preceding those of S. Sernin, i.e., that date from t the last years of the 13 th century. They are dhiefly capitals. There one can find better marked traces of an imitation of the Roman-Greek art of Syria. The importation was recent, but it was translated by a strength superior to the original art. H Here is one of those capitals (Fig. 30), whose recurved leaves and curved stalks seem copied from some Syrian fragments of the 5 th century, but with an entirely local and energetic difference. There are the elements of an art that continues to develop, not the symptoms of a decadence. The principal lines are simple, traced after those primitive principles, th that are found again in the arts that commence by returning to the observation of nature. Although those western sculptors may have sought the typical form, by which they were inspired, in the arts of the decadence -- for it is always necessary in the arts to find a starting point -- they revive those withered motives by a youthful addition, a freshness that appears in the principal lines. What we have seen them do in statuary, that compromise between the tradition of the Byzantine school that serves them for instruction, and the observation of nature peculiar to them, they do for the sculpture of ornament. What they combine with oriental art is a vivacious and youthful element, and the product that results from that mixture is more fertile in deductions, more logical than the original i self. The rigorous consequences of that intellectual tendency of Fr French artists in the 12 th century have been already explained in regard to statuary; they are still more apparent in the sculpture of ornament, that cannot be held to the reproduction of a certain form, the human figure, and leaving a broader field, to the imagination or to fantasy, if you prefer.

Before arriving at the great transformation due to the artists of the end of the 12 th century, t is necessary to pursue our survey of the different schools at the moment when B Byzantine influence made itself felt in the course of the dif-

different expeditions to the Orient. That influence is very o powerful in Languedoc, partial in Provence; it assumes a particular character in the centre of the establishments of Cluny. The ornamental sculpture of Vezelay has no more Roman that that of Provence; it is not Byzantinized, either by the influence of the monuments of Syria, or by the imitation of objects and of fabrics brought from the Orient, like that of Languedoc; it is evidently inspired by Roman-Greek art, but it appears on a soil so well prepared, that from its first attempts it attains originality. We have believed that we see at the birth of Cluniac statuary a transposition of the art of Greek painting; it would be more difficult to explain how the sculpture of Byzantine ornament attained at the first spurt almost the height of an original art in the great abbeys of Cluny. Greek painting no longer has any influence, for the Cluniac sculpture of the beginning of the 1[1] th century does not recall it. The Romanesque ornamentation of the 11 th century in the provinces of the Centre and East prepared nothing for that Cluniac school. Byzantine influence is recognizable and seems like a grain sown in virgin earth, thereby producing a plant with a new aspect, larger, better developed and especially with a beauty of unknown forms. Unfotunately the first attempts at that transformation are wanting, since the oldest parts of the mother church of Cluny have been demolished. We can seize it only in its entire development, i.e., from 1095 to 1110, the epoch of the construction of the nave of the church of Vezelay. It is a composition of ornaments better understood, f for example, than that of the triple capital of the mullion of the central portal of that church;[1] a capital intended to support two jambs and a pilaster decorated by statues, Fig. 31. (Art. Trumeau). If one finds in the execution of that sculpture, in the dissected leaves, sharp and strongly recurved, the imprint of the Roman-Greek art of Syria; if the mouldings and the mode of corpelling very frankly recall still more the architecture than the sculpture of those countries, the flexibility of the leaflets, their delicate modeling, and far from the dryness of Byzantine ornamentation. The passage from the rectangular pilaster to the curved abacus of the middle capital is skilfully drawn. One already recognizes a free art, possessing itself, and that knows how to find its way beyond

imitation. This other capital from Vezelay, with its broad le leaves terminated by a sort of grapes and great pendent drops (Fig. 32), although it may have analogies in the edifices drawn by count de Vogue and M. Duthoit, has it not a firmness of modeling[1], a curve of the whole, very superior to those Greco-Roman sculptures? But in most of those capitals, statuary is mixed with the ornamentation with rare success, a fact not found in the Byzantine architecture, and which at that epoch seems to belong to the western schools, born of their initiati

Note 1.p.182. Art. Porte, Fig. 51.

Thus there was at the centre of the establishments of Cluny a strong school of statuary and of ornamentation from the beginning of the 12 th century, a school that only made itself credited until the 13 th century, as we shall see, a school recommended by the breadth of its works, the incredible variety of its compositions, and the relative beauty of execution. The few examples possible for us to give however clearly show that this Cluniac school of the 12 th century on the confines of Burgundy, had no relation to that of Provence and that of Languedoc at the same epoch, although all these were inspired by the Roman-Greek arts of the Orient.

If we penetrate into the provinces of the West, we shall also recognize the presence of a fourth school of ornamentation, whose character is entirely local. Evidently there also the Byzantine influence due to the first crusades appears at several points, but that influence is without great importance, at least until the middle of the 12 th century. Some localities of that part of French territory possess Gallo-Roman monuments in great number, like Perigueux among others. There the ornamentation lags in a rude imitation of antique art, and the renovation by the Byzantine addition is scarcely sensible. But in Saintonge and Poitou appear influences due neither to Roman traditions nor to journeys beyond the sea. Those influences we believe are in part due to the forced relations op those provinces from the 10 th century with those hordes designated by the name of Normans, and that did not cease for nearly two centuries to infest the western shores of France. Those Normans were indeed terrible men, great pillagers, burners of cities and of villas, but it is difficult to admit that a people proceeding in its system of invasion with that sequence and

method, which established itself in the islands of the rivers and on promontories, that knew how to maintain itself, which possessed a relatively superior navy, and displayed a remarkable sagacity in its political relations, had not attained a certain degree of civilization, had not the arts or at least the industries. That people left in Iceland some remains of a very curious art; they came from Denmark, from the shores of the North sea, from Scandinavia, where one yet today finds u utensils of great interest, because they have striking relations of origin with Hindoo ornamentation. Now those manuscripts called Saxon that exist in London, and which date from t the 10 th, 11 th and 12 th centuries, manuscripts mostly very beautiful, present a great number of vignettes with ornamentation strongly resembling in style and composition those fragments of sculpture of which we speak. Those men of the North, those Saxons, men with long swords, appear to belong to the last emigration from the plateaus north of India. Whether named Saxons, Normans or Indo-Germans, altogether they came from the same source, from the great Aryan source. The objects that they left behind in the North of Europe, in Gaul and Denmark, and which are found in such great number in their graves, all exhibit the same for of ornamentation, and one can scarcely doubt, that this ornamentation is of north oriental origin. Now the so-called Saxon manuscripts are executed with rare perfection, and also present to us that strange ornamentation, interlacing animals that bite each other and bands, the whole painted with the most vivid and most harmonious colors. As an example we give here (Fig. 23) a copy of two fragments of those vignettes.[1] For whoever has visited the monuments of Poitou and Saintonge, it is impossible to mistake the relations e existing between the ornamental sculpture of the monuments of those provinces and certain paintings of Saxon manuscripts, or even the carved objects that these immigrant people from the North have left in their graves. This fragment of cornice A of the facade of Notre Dame la Grande at Poitiers, and this little tympanum B of the arcades decorated by statues on the same facade (Fig. 34), do not recall the pseudo-Byzantine sculpture of Provence, Languedoc or Cluny. Those artists of Poitou evidently suffered other oriental influences, that came by the North and by way of the sea.

Note 1.p.185. IV Evang. lot. Sox. Bib. Cottor. Nero. D. IV. p. 57. Brit. Museum. XII c. s.

In that province as in the others composing existing France, the art of sculpture did not awake till the end of the 11 th century. Poitou, Saintonge and the provinces of the West were led by the general movement aroused by the first crusades, except that their artists had among them an art in the embryo state, and they developed it. As Provence mixed with its imitations of the Greco-Roman art of Syria with the local Gallo-Roman traditions, the people of Poitou in learning their trade of sculptors from the Greco-Roman school, utilize the Indo-European elements received from the North, and even the Gallo-Roman elements. From all that they compose mixtures in which one of these elements sometimes dominates. Besides, between the traditions that they could have received from the North of Europe and the arts they had collected in the Orient, exist evident points of contact, certain relations of origin. The a alliance between Romano-Greek or Byzantine art and with these rudiments of art introduced into the North and West of France during the first centuries of the middle ages, by the last c comers from the great Aryan immigrations, was easier to make than between that Byzantine art and Gallo-Roman art. Thus in the monuments of Poitou and even of Normandy, Byzantine often was impressed with that art called Saxon by our neighbors, an while it retains only very weak traces of local Roman art. T The fusion of these two first elements occurs so as to compose almost an original art.

This capital (Fig. 35) from the nave of S. Hylaire of Melle is one of those examples in which the three elements are found. The composition of these scrollu recalls those interlacings, mats and north European ornaments. There is a Byzantine influence in the general form of the capital, in the effect of the sculptures of the abacuses; there is Gallo-Roman in the modeling and in the lobes of the leaves, a little heavy and s soft in execution.

In commencing this Article, we stated that it is dangerous in archaeology to pretend to classify in an absolute manner t the different styles of the same epoch. The infancy of human work proceeds by transitions, and if it be possible to seize some well characterized types, that clearly indicate centres

of schools, there exist a number of intermediate points at w which meet and mix in various proportions several influences. In Art. Clocher we have had occasion to indicate points of contact where several schools unite and form compoundr, that it is difficult to classify in an absolute manner. It is no less important to establish the nucleuses of types, aside from recognizing some of the junction points at which the mixtures a are produced that often defy analysis. Thus at Toulouse we have a school; at Poitiers we see another; then on the border between those two centres, a number of monuments possess sculptures that incline sometimes toward one of those schools, sometimes toward the other, or that mix their products so that it is difficult to separate the parts of each of the two influences. That explains itself. A certain abbey in Provence established a daughter in a neighboring province. It sent there its architects and perhaps some artists, but also took the workmen or artisans of the locality, trained in a different school from that of the mother abbey. Hence are mixtures of style. H Here a capital from toulouse, there a capital from Poitou or Saintonge; a relief with figures from one school and ornamentation from another. Thus one comprehends what scruples and c circumspection must be brought to the examination of these works of the 12 th century, if one pretends to classify them and to discover under what influences they were produced. For 25 years much has been written on the monumental archaeology of France, but men have not yet come to agree on what constitutes the last period of Roman art, up to what point the Byzantine influence acts, how and why it acts. Several archaeologists by taking some examples for the whole, have pretended that this Romanesque art is entirely inspired by the Byzantine, i.e., by Romano-Greek art in its decline. On the basis of other monuments, they have declared that the Romanesque was aboriginal, i.e., born on French soil, just as mushrooms arise a after rain, for example some considering certain edifices of Provence, have asserted that Romanesque was only Gallo-Roman art resumed and treated by new hands. Those different opinions, taking from the absolute that they have, are correct if one examines only one point of the question, wrong if one considers the whole. Our Romanesque doubtless belongs to us, but it everywhere has a foreign father. Here that is Roman, there

Byzantine, farther off is northern Hindoo. We have caused it and made it what it is, but by the aid of elements that all came from the Orient, save the Roman. And the Roman itself, whence did it come? We have sometimes seen persons astonished that certain capitals of the 12 th century have striking resemblances to the ornamentation of the Egyptian capitals of t the last dynasties. Yet nothing there is contrary to the logic of the facts. These arts all start from the same source c common to the great races, that have peopled a part of Asia and of Europe, and there is nothing extraordinary in that an ornament, which left India to plant itself in Egypt resembles the ornament from India that planted itself in western Europe. When the history of the great Aryan emigrations shall be well known from the most ancient even to the most recent, if one can be surprised, this is that there may not be still more similarities between all the art productions of those p peoples from the same nucleus and provided with the same genius, and that one has caused to intervene across that great current a Latin race, and that has combined Celts, Cymris, B Belgians, Normans, Burgundians, Visigoths and Franks, all Indo-Europeans, in that so-called Latin race, i.e., confined to some acres of central Italy. The historical questions of art would have been much simplified, if men had not pretended to make them proceed with the political history of the peoples. A conquest, treaty, a delimitation of frontiers, have an effect on the customs and manners of the people, and consequently on its arts, since there exists outside those purely political facts, affinities of races or at least relations of interest. The Romans possessed Gaul for three centuries, and covered its provinces by monuments; then as soon as the troubles of the great invasions had passed, did the Gauls return to Roman arts? No, they went elsewhere to seek inspiration, or rather found it in their own genius reanimated by a strong addition of peoples from the same source.

Men say to us:- "The French language is derived from Latin, thus we are Latins." First, it must be recognized that we have tolerably modified the Latin; that the genius of the French language essentially differs from the genius of the Latin language; then after unopposed possession for three centuries, the Roman had had time to impose his language, since he had

Byzantine, farther off is northern Hindoo. We have caused it and made it what it is, but by the aid of elements that all came from the Orient, save the Roman. And the Roman itself, whence did it come? We have sometimes seen persons astonished that certain capitals of the 12 th century have striking resemblances to the ornamentation of the Egyptian capitals of t the last dynasties. Yet nothing there is contrary to the logic of the facts. These arts all start from the same source c common to the great races, that have peopled a part of Asia and of Europe, and there is nothing extraordinary in that an ornament, which left India to plant itself in Egypt resembles the ornament from India that planted itself in western Europe. When the history of the great Aryan emigrations shall be well known from the most ancient even to the most recent, if one can be surprised, this is that there may not be still more similarities between all the art productions of those p peoples from the same nucleus and provided with the same genius, and that one has caused to intervene across that great current a Latin race, and that has combined Celts, Cymris, Belgians, Normans, Burgundians, Visigoths and Franks, all Indo-Europeans, in that so-called Latin race, i.e., confined to some acres of central Italy. The historical questions of art would have been much simplified, if men had not pretended to make them proceed with the political history of the peoples. A conquest, treaty, a delimitation of frontiers, have an effect on the customs and manners of the people, and consequently on its arts, since there exists outside those purely political facts, affinities of races or at least relations of interest. The Romans possessed Gaul for three centuries, and covered its provinces by monuments; then as soon as the troubles of the great invasions had passed, did the Gauls return to Roman arts? No, they went elsewhere to seek inspiration, or rather found it in their own genius reanimated by a strong addition of peoples from the same source.

Men say to us:- "The French language is derived from Latin, thus we are Latins." First, it must be recognized that we have tolerably modified the Latin; that the genius of the French language essentially differs from the genius of the Latin language; then after unopposed possession for three centuries, the Roman had had time to impose his language, since he had

in hand the government and the administration. Latin was adop-ted as the usual language on the area of Gaul, and men did n not cease to speak it, were this only to complain in those c countries ravaged by invasions, but they ceased to build, to sculpture and to paint; from the 5 th to the 8 th centuries was time enough to forget the practice of the arts. Yet When a tolerably stable social condition succeeds that chaos, when one could think of building palaces, churches, monasteries and houses, when one pretends to decorate them, why do not those Gaulish peoples very simply take up Roman art where they left it? Why (in matters purely of art like sculpture) do they go to become inspired by other elements? Because that then they had a local genius in the latent state, revived again by currents from the same origin, as we have just stated, and that this genius at the first opportunity sought to develop itself according to its nature. That is not a question of ignorance or of barbarism, as so frequently repeated, but one of temperament.

By instinct, if not by calculation, those Roman artists did not wish to resort to Roman art, or at least to Gallo-Roman art. Indeed, it would be strange, that those Romanesque architects and sculptors of the beginning of the 12 th century had around them on Gaulish soil a quantity of Gallo-Roman monuments, and should have neglected them to take up with aviditythe Greco-Roman or Byzantine art of the Orient as soon as they s saw it, if they had not felt a sort of instinctive repulsion for the degenerate Roman of Gaul, and an affinity for the Grecized Roman of the Orient. Was it then that Grecian difference that attracted them, was sympathetic to them? Were they wrong? And was the 17 th century right in Romanizing us anew by motives quite foreign to art? That an absolute sovereign like L Louis XIV found it convenient to stifle private genius in our country to ensure monarchical power in France, as he believed, one conceives this without difficulty, but that the country itself should become an accomplice in that pretense could not occur. Yet Louis XIV was a great king, if not a great man, a and he knew so well how to combine all the wheels of his mechanism of Romanization, that we have found at every step entire parts acting well or badly, like the old machine at Marly. Am Among these wheels, the arts were one of those best established.

an academic monopoly, direct governmen protection of artists, an official art, nothing wanting to that mechanism except the vital element that develops the arts, liberty and affinity w with the tastes and sentiments of the people.

At the beginning of the 12 th century, there was neither k king, lord or prelate, who could assume that extreme power of confiscating the genius of a nation for the benefit of a political organism. Each province developed according to its traditions, preferences and spirit, accepted external influences in the manner that suited its tastes and feelings; however much men desired to move the feudal regime, it never had the pretension to compel artists to subject themselves to any school of art. The mark of that independence of the artist is found on the monuments themselves; is it not from that which they derive their most powerful charm? It is in the Gallo-Roman epoch, we see over the entire area of the French territory, on a thousand different monuments, the same capital, the same decorative composition, the same principle in statuary or ornamental sculpture, are not weariness and disgust the result of that state of things? men will contend with wealth, we grant indeed; if on certain edifices in Lyons is placed $20,000 in sculpture, $40,000 of it will be put on one in Marseilles. We shall have $40,000 of fatigue instead of only $20,000 worth. The least grain of originality would do our business better. Now is there not a great charm in finding the trace of the t tastes of those different provinces differently provided with traditions and aptitudes? Is it not a very vivid pleasure, in passing through the provinces inhabited or colonized by the Greek races, to discover in Attical Peloponessus, Sicily, Caria, Ionia, Macedonia and Thrace, very different expressions of Grecian art? Is it not a true satisfaction for the mind on leaving the Romanesque edifices of Berry, to find in Poitou, Normandy or Languedoc, different styles and varied schools, so to speak, reflecting the diverse geniuses of those peoples? Even in each monument with satisfactory masses, do not those capitals with different compositions offer more interest for the mind and eyes than those long rows of Roman capitals, all copies from the same mould? One will object that symmetry, d dignity and unity require that repetition of the same note. As for unity, it nowise excludes variety, there is no unity

without variety, properly speaking; as for symmetry and dignity, what matters to us those purely conventional qualities, if they fatigue and bore us? majestic boredom or boredom cut short is all one.

The Greeks of the late time thought thus, for in those monuments of Syria that they have left us, and at S. Sophia of Constantinople, they admit variety in the composition of the capitals of the same order, in the ornaments of the lintels, tympanums and friezes of the same monument. It is well understood, that our western artists follow their example in that, and they avoided recourse to the majestic monotony of the ornamentation of the Gallo-Roman monuments, when they again took in hand the practice of the arts.

Before passing onward, it appears to us useful to define, if possible, this Byzantine art to which we appeal at each instant; indeed, how observe the nature of its influence, if we know neither its different elements nor its proper character? We should be happy to refer to that work on art or archaeology, which has distinctly defined what is understood by the Byzantine style, and to start from that point acquired for knowledge. But in vain have we sought that clear and precise summary. All the scattered documents that we could consult show only one side of the question, considering only one detail; as for the summary grouping those works, we do not think it exists. Let us then endeavor to constitute xx for the known Byzantine arts the consequences that we can derive from their influences on western art, on ours in particular, that will seem natural. Do not forget that it concerns sculpture here.

To see in the art of Byzantium a compromise between the style adopted by the Romans of the late empire the same traditions of Greek art is certainly not to be mistaken, but it is to consider a complex phenomenon in a rather too summary manner. It is necessary, -- the art adopted by the Romans being well known, -- to know what were those traditions of Grecian art on the Bosphorus in the 4 th century. That Greek art was already Romanized before the establishment of the capital of the empire at Constantinople; but it was Romanized by passing through different screens. Now since the Romans in sculpture had no art peculiar to them, they found at Constantinople a Grecian art modified by the Latin element, all things consid-

considered, that they had adopted everywhere, or they could employ Grecean artists. The Romans brought to Byzantium their organizing genius in the matter of great public works, their construction, their taste for magnificence and grandeur, but they added nothing to the artistic element of the Greek. What were those Greeks of Asia in the th century? Had they rigorously followed the beautiful traditions of Attica or even those of the Ionian or Carian colonies? Did they recall in some ways those little republics of Attica and of Peleponessus, that regarded all foreigners as barbarians? Certainly not; those peoples in the midst of which was planted the capital of the empire was a confused mixture of elements, that during the œ centuries had been separated and even enemies, but which ended by fusing. Greek genius dominated still within that mixture, sufficiently to utilize, not enough to refine it.

Besides, why did the Roman empire transfer its centre to Byzantium? Henceforth master of the West limited by the ocean, tranquit in the North (at least so believed) since the wars of Trajan, and since it had organized a sort of Germanic league devoted to Rome; on the side of the Orient it found a broad continent in great part unknown, into which its armies penetrated while daily encountering both natural obstacles and innumerable warlike peoples. Byzantium was the base of operations best chosen (admitting the situation of the empire at the beginning of the 4 th century), both for retaining the a ancient conquests and for preparing for new ones. Also there, and this is what interests us here, was the nucleus of all t the commerce of the world then known. Now it is useless to s say that the empire pretended to monopolize all the products od the globe and of the industry of all nations, from ivory to the timber for carpertry, from pearls to the ordinary metals, from spices to precious fabrics. Long before the establishment of Constantine at Byzantium, that city or rather the cities on the Bosphorus were the aim of the caravans coming from the northeast by Pontus, from the East by Armenia, from India and Persia by the Tigris and Euphrates. With those caravans came not only art objects made in those distant countries, but also artisans seeking fortune and attended by the p prodigious consumption of all the products of the Orient, made by the empire. Thus it was natural that the Grecian element,

which existed and had been able to dominate the shores of the Bosphorus, should be influenced anf profoundly modified by t those added Persians, Assyrians and even Indians, which the caravans caused to continually flock to Byzantium.

After the establishment of the empire within its walls, Constantinople became ye more a cosmopolitan oriental city. The luxury of the court of the emperors, the extended commerce ca carried on in that capital so admirably located, gave to the arts that we call Byzantine a character, which although still impressed by Grecian genius presents a mixture most curious to study, of Grecian art properly so-called, with the arts of the Persians and even of India. As a proof, we shall present the works of count Melchior de Vogue, that we have frequently cited previously, on the cities of the Hauran, and that of M. W. Salzenburg on the oldest churches of Constantinople, including S. Sophia.

The monuments of the Hauran, i.e., contained in those little cities between Aleppo and Antioch, that were only stops for t the caravans that came from the Persian gulf by the Euphrates, monuments to which we have given the name of Greco-Roman, dating from the 4 th and 5 th centuries. Their sculpture is strongly impressed wit the Greek style, without human figures and without Persian influences, the last in date alone presenting some reminiscences of Arsacide and Sassanian sculptures. But it is not thus for the sculpture in Constantinople that dates from the 5 th and 6 th centuries, [1] for that is far more Persian in style than Greek or Greco-Roman. The arts of the Persians had profoundly penetrated the ornamental sculpture of Byzantium to the point that certain capitals or certain friezes of S. Sophia, for example, seem torn from the monuments of Persia, and even from Assyria. Indeed, one perfectly understands how cities like those of the Hauran, that served only as places for rest, only as stops for the caravans traveling toward Antioch, not able to receive from those caravans and products or articles before being delivered to the merchants at the destination. In brief, and to employ a common expression, those caravans only unpacked at Antioch,:and what t they left on the route could only be objects of little importance proper to be exchanged for the food and lodging, that they found in those cities. But Constantinople was an emporium,

where come to be heaped up all the most precious objects brought from the Persian gulf by the caravans ascending the Tigris, passing through Little Armenia, Cappadocia, Galatia and Bithynia. At Constantinople those objects were seen by all; P Persian artists or artisans established themselves there, and Greek art properly so-called, still so vivacious in the Hauran, i.e., in the vicinity of those ancient Greek cities of Lycia, Caria and Cilicia, Grecian art at Byzantium, far from its primitive centres, was stifled beneath the continual addition of all those Persian elements.

Note 1.p.183. See the work of M. Wo Solzenberg. Alt-Christliche Baudenkmale von Constantinopel. Berlin. 1854.

So then if we mean by Byzantine are the art of Constantinople in the 6 th century, we must in regard to the sculpture consider that art as a mixture in which the Persian element e essentially dominates, not only the Persian element of the S Sassanides, but even that of the Arsacides, and in which the Greek element is almost entirely stifled. On the contrary, if we mean by Byzantine art the art of Syria from the 4 th to the 6 th centuries, we shall admit that the Greek element dominates, particularly id we take central Syria.

At the end of the 11 th century and the beginning of the 12 th, the crusaders being scattered in the Orient from Constantinople into Armenia, Syria and Mesopotamia, one must not be surprised if in the art elements that they could bring back frog those countries, one finds both pronounced Grecian influences, Persian influences, and influences produced by mixtures of these arts effected previously. For example, if certain Romanesque sculptures of France recall the execution and even the style of some reliefs of Persepolis, others of the cities of the Hauran, still others of Palestine and even of Egypt; not that the crusaders were in Persia, but because they had under their eyes objects of even monuments, that perhaps were inspired by Persian antiquity.

Let us resume the examination of our French schools. The school of ornamental sculpture of Poitou and Saintonge extends its branches as far as Bordeaux, but in ascending the Garonne it does not go beyond Mas d'Agen. Again in that last city this school suffers the influence of the centre Toulouse. The church of Mas d'Agen shows us beautiful capitals, some belonging to

the school of Saintonge, others give a mixture of the two schools, approaching that of Toulouse. For example, such as this. (Fig. 36). The ornamentation of the abacus belongs to the Romanesque impressed by Greco-Roman arts. The figures of a style better than those of Poitou and Saintonge recall the statuary of Toulouse.[1]

Note 1.p.185. It must be stated, that the school of statuary of Poitou is superior to that of Saintonge, but these two schools differ only in the quality of the execution, the artists of Poitou being very superior to the artists of Saintonge. As for style, it is the same in the two provinces.

Cahors likewise presents in the 12 th century in ornamentation as in statuary a mixture of influences due to the western and southern provinces. But where this mixture is well marked is at the abbey of Souillac on the old road from Brives to Cahors. The reliefs and sculptures that decorate the interior of the doorway of that church have a character that approaches both the north Hindoo genius, traces of which we found at Poitiers, and to the Byzantine arts. In the eccentric composition of the left pier at the doorway of the abbey church of Souillac (Fig. 37), one can point out certain relations with the system of composition of Fig. 33, copied from a Saxon manuscript of the British Museum, in the statue A that decorates one of the jambs of the same doorway, one recognizes the Byzantine influence that acts so powerfully at Moissac, whose sculpture is derived from the school of Toulouse. Those animals of the pier of Souillac, which bite and are matted together, are found neither in Gallo-Roman sculpture nor in the Greco-Roman sculpture or painting of Syria. To find analogies of that art it is necessary to have recourse to Scandinavian, north European or Icelandic monuments, or to those manuscripts called Saxon in London, or again to certain Hindoo sculptures; yet it must be recognized that in the example furnished to us by the church of Souillac, there is a marked tendency to imitate nature. Some of those animals have an appearance of reality, and are no longer arranged to form ornament. The artists probably had then seen a certain number of those north European products, but those only inspired them, while in execution r referring to the observation of nature. It would be defficult to give the meaning of this strange sculpture. The relief of

the tympanum, whose archivolt is supported by those piers, represents a legendary subject in which an abbot and the demon are found together to treat of certain affairs, that terminate to the detriment of the tempter. Two seated statues of S. Peter and of a holy abbot flank the reliefs. We cannot indicate any relation between these reliefs of the piers, if indeed the artists thought of such.

At Moissac are found on the mullion of the great portal of the church reminiscences of that north European or north Hindoo art in the lions interlaced and superposed, comprised between two curved denticulations.

So then the school of sculpture of Toulouse came to mingle at Moissac and Souillac with the school of the western coasts of France; now this seems to have received oriental elements of very high antiquity by Scandinavian or Norman expeditions, while the school of Toulouse only obeyed Gallo-Roman traditions profoundly modified by a Byzantine addition.

It is far from being our thought to desire to establish systems or absolute classifications, and in a question so complex, we should beware of leaving aside examples that would tend to modify these general views on the origins of the French arts of the middle ages. There remain few fragments of Romanesque architecture at Limoges. Yet because of the establishment of Venetian agencies in that city, an art movement must have been produced there after the 10 th century. From the point of view of architecture, S. Front of Perigueux is the proof of this. But in considering that the ornamental sculpture in the lities of Limousin, one finds some traces of an art, that is neither the Romanesque of the West nor that of Toulouse. That decorative art more than any other seems inspired by the sight and the study of that quantity of objects, fabrics and jewels that the Venetians brought, not only from Constantinople, but from Damascus, Tyre, Antioch and the coasts of Asia Minor. We find an evident trace of it in an edifice of the end of the 12 th century, S. Martin of Brives; the capitals of the western doorway present this composition of ornaments (Fig. 38), that strongly recalls the capitals of a distant epoch, no longer Byzantine but Arab. [1]

Note 1.p.188. It is clear that we mean here the art called Arab, but which in great part is due to the artists of the epoch of the Sassanides.

The church S. wartin of Brives is otherwise a remarkable e edifice. Its oldest parts date from the first years of the 12 th century, but the nave and the doorway, from which come the capitals (Fig. 38), were built about 1180. The principal nave and its two side aisles are vaulted at the same height. Very slender cylindrical columns support these vaults. An elevated passage extends internally at the level of the sills of the windows of the side aisles. The sculpture is otherwise sober, but in these statatures of the end of the 12 th century affects very pronounced oriental character.

The monuments of the 12 th century in Limousin, or rather in the country that is now occupied by the departments of Creuse, Haute-Vienne and Correze, are rare. Those that remain standing have such sobriety of ornamentation,-- the richest having been destroyed in the wars of religion, -- that it would be difficult to properly determine if there exists a centre of art, a school of sculpture in the 12 th century, as in Languedoc and Poitou. On the contrary, if we approach the centre, if we enter Auvergne and Velay, we find numerous traces of an art, neither that of Toulouse, of Poitou, nor that of Limousin. There until about the beginning of the 12 th century the Gallo-Roman reigns as master. [1] The capitals of the oldest part of the cloister of the cathedral of Puy, that dates from the first half of the 11 th century, ane badly copied R Roman sculptures; but about 1130 a new art, fine, careful and flexible, develops. One can judge it by this capital (Fig. 39), [2] which is no longer Gallo-Roman, but which is not Byzantine by composition nor by execution. Beside this piece, parts of cornices of the same epoch (Fig. 40) on the contrary emphasize the oriental influence, both by the presence of objects from the Levant brought by the Venetians, and by the view of monuments of the epoch of the Sassanides, for that ornamentation of palm leaves rounded and beaded, mixed with animals, is rather Persian than Byzantine. On the contrary later, about 1180, when in the provinces of the North the lay schools have completely laid aside the Greco-Roman influences, the artists of Auvergne submit to it, but evidently at second hand. It is t the Romanesque more or less Byzantine of Languedoc and Lyonnais, that comes to mix with the remains of Gallo-Roman traditions and with those oriental elements received from Limousin.

This fragment of the southern porch of the cathedral of Puy, whose construction does not precede the end of the 12 th century (Fig. 41) marks those different influences and their mixture, that in spite of the skill in execution of the sculptors, shocks by the lack of unity, both in the entirety and in the details.

Note 1.p.180. From the cloister of the cathedral of Puy-en-Velay; part from the 12 th century.

Even by its geographical situation, the school of Auvergne remains undecided between its powerfully established neighbors. It reflects sometimes the one, sometimes the other, and the more it advances toward the end of the 12 th century, the less can it take a part between those different influences. It is true that it redeems that uncertainty by the delicacy of execution and by care in the details, but it does not succeed in forming its own style. Thus when the beautiful schools of the South are extinguished at the end of the 12 th century, the sculptors of Auvergne are deprived of guides, leave and prod- nothing by themselves, and only at the end of the 13 th century does the art of sculpture rise in that province with the importation of the arts of the North.

It was not thus in Berry. That central province is one of those, which besides quite powerful Gallo-Roman traditions, a adopts certain very pure Byzantine elements. We have a most characteristic example at Bourges itself. There exists in that city a gate of the monastery of S. Ursin, that dates from the end of the first half of the 12 th century, and that is still seen entire in Rue du Vieux Poirier. That gate is first very interesting in construction, as it presents a cut lintel supporting a tympanum and relieved by a round arch. The tympanum with very flat reliefs represents fables at top; below in the second zone is a hunting scene, that appears to be copied from those reliefs so frequently sculptured on sarcophaguses of the late time. In the lowest zone are the labors of the months of the year. On the dressed lintel develops a sort of Roman scroll, Beside those sculptures, that are evidently imitated from the antique fragments so numerous at Bourges in the 12 th century, are found jambs, capitals and little engaged columns believed to be copied from the sculpture of Constantinople, so well that several have long believed that this gate, erected

in the 12 th century, was completed by the aid of fragments f from an earlier epoch. Yet that is not admissible, for on examining it more closely, the figures are clothed in costumes of the 12 th century; the execution, cutting anf inscriptions, belong to that epoch. Besides under the tympanum a panel contains this legend (Fig. 41 bis).

Here (Fig. 42) is a part of that gate that clearly indicates the combination of the Gallo-roman and Byzantine styles. One even sees that the workmen charged with the execution of the front jamb A had already modeled the upper part of the ornament in the style of that of the lintel, and that they abruptly abandoned that heavy and soft work to adopt the close and flat style like an engraving, and Byzantine ornament. The little column is entirely sculptured in that oriental style. We give a fragment of it at B.

There is seen to appear in Berry at Chateauroux (church of Deols), S. Benoit-sur-Loire, S. Aignan, Neuvy S. Sepulchre, etc., in the sculpture of ornament from the end of the 11 th to the middle of the 12 th centuries, undoubted traces of this approximation betweer the corrupt Gallo-Roman art of the Greco-Roman art of Syria imported by the first crusades, without that from this mixture results just as at first a formed art, complete as in the Romanesque of the South, that of Cluny or of the West. Those artists experimented during almost all the first half of the 12 th century, without succeeding in entirely fusing these two elements. Beside a very refined imitation of Byzantine sculpture is a piece heavily inspired by the Gallo-Roman remains, as in the preceding example, that approaches 1150. Still the old fragments of the cathedral of Bourges,[1] that decorate the two north and south doorways, and notably the lintel with great scrolls of one of those two doorways, f from 1140 to 1150, present sculpture of very frank character, much approaching the Romanesque art of Chartres and of Isle-de-France.

Note 1.p.204. Romanesque fragments replaced at the north a and south doorways during the reconstruction of the cathedral in the 13 th century.

In fact about this epoch the Romanesque school of the North develops over an extensive area that comprises Isle-de-France properly so-called, and part of Normandy, Beauvoisois, Berry,

the Chartrain country and lower Champagne. That school from 1130 to 1145 had known better than any other (except the school of Toulouse) how with these elements to compose a particular style, that is neither the Byzantine nor a corruption of the Gallo-Roman, nor a reminiscence of North European art, but which has a little of all that, and which on the whole produces beautiful results. Arriving later than the schools of the centre and South, and especially than the great school of Cluny, perhaps it profited by the efforts of its predecessors, and could better make a more complete mixture of those different styles.

Yet when one goes back to the first attempts of the school whose centre is Isle-de-France, after having abandoned the Gallo-Roman traditions remaining on the soil, one cannot mistake that this school reacts against those conditions more than a any other. One could see there in the awakening of a Gaulish mind, the more as it is very difficult to comphehend otherwise the sort of repulsion that the art of sculpture manifests at the beginning of the 12 th century for all that recalls the Romanesque style. In the other provinces at the bottom of all sculpture is found something of the antique art adopted in Gaul, and more particularly in Languedoc, but around Paris appear new or renewed elements.

This school of Isle-de-France was certainly relatively barbarous at the beginning of the 12 th century. The specimen of ornamental sculpture that we give here (Fig. 43) from the abbey church of Morienval,[2] is very far from the beautiful and broad sculpture of Vezelay, that of Toulouse or that of Quercy. But one can see there only coarse reminiscences of the antique arts. The horse carved on one of those capitals is also found on a great number of Gaulish coins preceding Roman domination. This ornamentation inspired by basket-work itself is more Gaulish than Roman. Even the execution recalls the linear work that decorates certain utensils of our ancestors. Why have t the memories of Roman arts felt fewer traces in those provinces than in others of Gaul? We shall charge ourselves with explaining this, since the territory of Isle-de-France and notably the vicinity of Soissons and of Compeigne was covered by very important Gallo-Roman edifices, whose ruins we find at every step. After 1100 years, how did the inhabitants of that

territory return to the art forms employed before the Roman d domination? How could they have retained these forms in a latent state, like the national tradition? Those are problems that we cannot solve in the condition of historical studies. To propose them is already something, as it opens new horizons.

Note 2.p.204. Capitals of the apse, whose construction dates in the first years of the 12 th century. We owe these drawings to M. Boeswillwald, who has courteously communicated to us the very detailed studies made by him on that interesting monument.

Without launching into the field of hypotheses, one knows e enough of it already today to recognize; that the traditions od a people leave nearly indelible traces through conquests, invasions, delimitations of territory, as if to give a perpetual contradiction to history, as it has been written until t this day; that the principle of nationality reappears at certain epochs to disconcert the political combinations, that appear most solidly conceived. In the history of this world, the people, their tastes, affections and aptitudes certainly play a part far more important than was imagined even a half century since. Thus we think that they have given too great a place to the enfluence of Roman civilization on the Gauls, and that this influence was entirely governmental and admissible, and in spite of three centuries of domination without troubles, never sent into the national soil but short roots, that the feudal arrangement and the introduction of elements identical with those of the old Celtic Gaul in the 5 th century could only revive the national genius, compressed during the Roman period, and that finally at that epoch of the middle ages when comparative order was reestablished, that national genius regarded as a time of arrest, a gap, the period of domination and of disorder comprised between the 1 st and 11 th centuries.

If in the monuments remaining to us from the Carlovingian epoch, we see sculpture in Gaul strives to approach the antique arts, and rudely copy Roman ornaments, why at the end of the 11 th century did they abandon these traditions on a part of the territory destined to form the nucleus of that national unity dreamed of by Vercingetorix 50 years B. C.? Why did the arts of those French provinces surrounding Paris, after having produced rude attempts of which we give a fragment (Fig. 43), only adopt with reserve both the importations from the Orient

.ccepted with enthusiasm beyond the Loire and the remains of Gallo-Roman edifices by which they were surrounded? And when finding themselves in a situation of relative inferiority at the beginning of the 12 th century, if one places them in parallel with the school of the Cluniacs and those of the South, did they attain on the contrary after 1150 a marked superiority over the schools of the East and of beyond the Loire? Would this then be that the national genius, better preserved in those provinces near Paris, more exposed to foreign importations, and thus would find itself better suited to conceive an original art?

The Romanesque art of Isel-de-France and of the neighboring provinces at the beginning of the 12 th century is relatively barbarous, and this is incontestable, but in those provinces in a few years things change appearance. While sculpture in the southern and central provinces does not advance, and on the contrary tends to weaken towards the second half of the 12 th century, undecided between respect for the different traditions and the observation of nature; in the royal domain it forms a great school that no longer recalls Gallo-Roman sculpture, that recasts, so to speak, Byzantine art and appropriates it, which does not absolutely neglect those scattered traces of art that we call north European, but which knows how to derive from all those elements foreign to local traditions unity in composition, style and execution, a fact that we vainly seek elsewhere on Gaulish soil. That school thus preludes the infancy of that so complete lay art of the end of the 12 th century, also so origonal in the construction of edifices as in the entirely novel manner of decorating them.

Here (Fig. 44) are twin capitals from the tower of S. Martin-des-Champs at Paris, whose sculpture attains to the height of a complete art. Certainly one indeed finds there Byzantine elements, but not of that Byzantine art of the monuments of Syria. This sculpture rether recalls that of the diptychs and ivory bindings,of Byzantine goldsmiths' work. The feeling in the composition is grand, clear and sustained. In the fragments deposited at the imperial church of S. Denis, at Chartres, the church of S. Loup, and in some edifices of Beauvoisois, one finds the same qualities. There is no need to emphasize the differences that distinguish this art from the Romanesque arts

of the South and Centre: the latter, whatever the beauty of c certain examples, remain in the shape of experiments, and do not succeed in completely developing themselves. Unity is lacking in the school of Toulouse, in that of Auvergne and of Quercy. It is found more in the school of Poitou, but what heaviness, monotony and confusion, in comparison with those already clear anf well treated compositions of the Romanesque of Isle-de-France about 1135!

If am example be desired, let us examine those shafts of t the little columns on the western portal of Notre Dame of Chartres, that separate the statues. Those shafts are covered by sculpture for their entire length, and date from about 1135 (Fig. 45). If the composition of those interlacings is charming and well understood, without confusion, at the scale of all in the vicinity, their execution is perfect. The little figures climbing in the scrolls are in movement, and are broadly treated, and well arranged.with the ornamentation so as not to destroy the unity of the general effect.

Where did the Frencrh sculpture obtain those examples? Everywhere and nowhere. Everywhere, for since the Roman epoch men had often sculptured the shafts of columns, notably in Gaul, since in the provinces of the East before that epoch the shafts of columns were decorated. Nowhere, because in that sculpture of antique or mediaeval shafts, men find no new principle, only a network in full relief enveloping the column, like a branch twisted around it.

Articles brought from the Orient, handles of ivory of wood, might have given the sculptor of Chartres the idea of this graceful decoration; but the style of the ornamentation and the execution belong to it. Let us remark that these little columns placed between the statues are of work simple in mass if not in details, and admirably emphasize the statuary by forming a sort of richly modeled tapestry in the intervals s separating them.

But already at that epoch, what distinguishes the school of the royal domain from all other Romanesque schools of France, is the perfect harmony of the scale in the ornamentation. From Toulouse to Provence, Lyonnais to Poitou, on the Loire and in Normandy and even at Vezelay, the ornamentation is often very remarkable, but is very rarely at the scale of the monument.

Also rarely is there agreement of scale in the ornaments of t the same edifice. Thus we shall see at S. Sernin of Toulouse capitals covered by details of extreme delicacy beside capitals with broad masses. At Vezelay, where the sculpture is so beautiful, we shall note on the lateral doorways of the nave, archivolts whose ornaments crush everything around them, delicate capitals crowned by abacuses whose sculpture is too large. In Provence are infinite details on the mouldings, whose effect is destroyed by the vicinity of a heavy frieze. The e example of the doorway of S. Ursin at Bourges (Fig. 42) gives exactly the idea of that lack of observation in the relation of scale to the ornamentation. Those considerable defects are avoided in the developed Romanesque of the royal domain, end in fact it is already a superior art, for it does not suffice for an art to be beautiful, it must participate in the entirety, and not seem to be a fragment placed by chance on an edifice.

Yet there occurred a revolution about 1160 in the art of ornamental sculpture as in that of statuary. The artists prepared to abandon entirely those influences and those traditions, that had always acquited them until then; influences and traditions preserved in the cloisters, real schools of art. From archaism statuary passed by a rapid transition to the careful study of nature; it is the same for the sculpture of ornament. On taking the head of the arts, laymen seemed wearied by the long series of more or less happy experiments, attempted for establishing an art on preceding elements. Henceforth, instructed in practice, they came to the always new source of nature. Precisely at the epoch of the crusades of Louis the Young and Philip August, one notes a sort of renaissance of the arts in the West aroused by the oriental influence, that the French architects reject both in the system of architecture and in sculpture, all the oriental influences, that at the beginning of the 12 th century had such a great effect on the development of our different schools. But that movement is not general o over the area of Gaul; it only makes itself felt in the provinces of the royal domain, in Burgundy, Champagne and Picardy. The predominance of the art of the North in France over the art of the South is assured from that moment. Just as the language of "oil" tends daily to reduce the other French dialects to the state of "patois," so the schools of architecture and

of sculpture of the royal domain tend to substitute themselves for those provincial schools, still so brilliant at the middle of the 12 th century. We explain elsewhere [1] how the lay sculptors of the end of the 12 th century seek their inspirations in the flora of the fields and forests; how certain timid attempts had been made partly in this direction from the beginning of the 12 th century by the best French schools, and notably by the artists of Cluny, yet without those experiments bringing an important addition in opposition to oriental influences or Gallo-Roman traditions; but finally, how that observation of nature formulates itself in the invariable principles within the school of the royal dămain from 1190 to 1200.

Note 1. p. 210. Article Flore.

Yet it does not seem that this school first resumed the path scarcely entered and soon abandoned by some artists, nearly a century earlier. Still the school of Cluny marches at the head, about 1170; and if it is very quickly passed by the logical spirit of the lay artists of Islē-de-France, it is no less n necessary to render this homage.

Among other qualities and defects, the spirit of the people of which Paris had become the centre passed abruptly from the idea to the practice by a logical deduction; our revolutions and our customs are the proof. An idea and principle are no sooner advanced with us, than one pretends to put them into practice immediately.

In Germany men will discuss for centuries the decline of a system or the vitality of a principle before seriously thinking of destroying the first or of adopting the second; in France and especeally at Paris they pass very quickly from the theoretical discussion to results. If in the domain of art t the academies have been able in two centuries to delay that logical current leading from theory to practice, such as did not exist in 1180, and that it only appeared that the monastic schools claimed to take this part, it is not surprising that the lay school, then nearly formed, should throw itself earnestly into that application of new principles to sculptured ornamentation, the more that it hastened to finish with that Romanesque art, which in its eyes represented monastic feudalism, of which it desired no more, whose arts S. Bernard had defamed, and that the bishops tended to destroy.

In spite of the reproaches of the founder of the order of Citeaux, the school of Cluny no less held to retaining the elevated rank, that it had taken in the practice of the arts. From this point of view, it claimed to advance with the age and to distance it if necessary. About 1130 its relations with the Orient were extended. It then erected the narthex of the church of Vezelay, whose ornamentation is better permeated by that Greco-Roman art of Syria, than is that if the nave. Some years later about 1140, it built the chapter hall of the same church, whose sculpture is so strongly impressed by the Byzantine art of Syria, that one believes that he sees in most of the capitals and corbels, fragments torn from those Greco-Roman cities of the Hauran. In that path of imitation or rather interpretation, one cannot go farther without falling into monotony, for that Greco-Roman ornamentation, and even Greek ornamentation, its ancestor, does not shine by variety. The Cluniac school thus forms a time of rest, and sought new elements that were lacking in the mass of traditions employed by it. Those elements it found in the plants of its fields; it thought that instead of imitating that conventional foliage attached to the friezes and capitals of Syria, instead of attempting to modify them according to the tasts of the artist, it would be better to take the plants that grow in the country, and to attempt to substatute them for the traditional flora, that it reproduced constantly with more skill that charm. Henceforth that school, broken to the difficulties of the trade, skilful in hands by long apprenticeship, was capable of rendering with delicacy those plants that were to replace Romanesque ornamentation at the end of invention or imitation. Thus its experiments are master strokes. About 1160 were opened in the chapter hall of Vezelay, built within 10 years, three arches looking into the cloister. Those three arches are decorated by capitals and sculptured archivolts, whose flexibility and elegance are unequaled. The general form of these capitals a again recalls the Romaneszue form, but the details imitated f from the flora of the fields are composed with a grace and decilacy of modeling, and the most practised hand attains this with difficulty.

Here (Fig. 46) is a fragment of those groups of capitals cut in the stone that has the ardness and fine grain of marble.

Those sculptors had not gone far to seek their model for ornament. They gathered some young sprays of columbine.

This bit of archivolt (Fig. 47) belonging to the same construction, of such a beautiful character, and those capitals indicate sufficiently the progress that the Cluniac school had made in resorting to nature in the composition of ornaments. The Romanesque tradition appeared there only in the entirety of the composition and in the monumental appearance given to that foliage inspired by the flora, rather than copied.

Yet one will observe that the criticisms of S. Bernard took effect. In the unnatural sculpture of Vezelay, as the English say, until the year 1132 of the dedication of the narthex, on the capitals abound the human figure, animals and Bestiaries. Already in the sculpture of the chapter hall, a little more modern, those figures disappear almost entirely. The very rich ornamentation of the three arches opened from 1160 to 1165 in that hall no longer bears a trace . Already the natural f flora is substituted for those elements loved by the Romanesque sculptors and especially by the Cluniacs. But the architecture which bore at Vezelay that already natural sculpture was still entirely Romanesque; it only becam Gothic, i.e., conceived according to the system of Gothic construction, only in the construction of the choir of the same church, i.e., about 1190.

The art movement was not produced in the same manner at S. Denis in France. It was in 1137 that abbot Suger commenced the construction of the abbey church, of which we still see the substructure around the choir and the narthex. The edifice was erected in three years and three months and thus was finished in 1141. Now if the construction of the abbey church of Suger is entirely Gothic, [1] the ornamentation scarcely tends to imitate the flora, and as if temporarily.

Note 1.p.212. On this subject see the two excellent articles by our very justly regretted friend, M. Felix de Verneilh, in Annales archaeologiques. Vol. XXIII, p. 4, 115.

It was in 1128 that the Franks, as the Arab authors call them, attained the climax of their power in the Orient:- "The empire of the Franks," says the author of the history of the Atabeks, [2] "extended at that epoch from Maridin and Schaiketan in Mesopotamia to El Arish on the frontiers of Egypt; and of all the

provinces of Syria, Aleppo, Emesa, Hama and Damascus alone had been able to escape from their yoke. Their troops advanced to Amida in Diarbekir, without leaving alive either the adorers of God or the enemies in error; and in Al Djezireh to Rassam and Nisibe, leaving to the inhabitants neither goods nor money." Indeed at that epoch, i.e., from 1125 to 1135, the construction of our western monuments best recalls the various ornamental styles, whose sources we have indicated above. After 1137 Zenghis had taken a good number of places from the Christians, and had fortified himself in Syria; in 1144 he obtained possession of Edessa. After that epoch the affairs of the western men only grew worse in the East. Noureddin continued successfully the work begun by Zenghis. Yet in 1164 and 1167, the Christian armies of Syria twice invaded lower Egypt, and maintained themselves there until in 1169, in the fear of seeing Mussulman armies attack the kingdom of Jerusalem at the same time by the North, East and South. As for the Christians after 1170, the Orient was only a field of battle, where it was necessary to defend themselves every day. No commerce, no safe establishments, no more relations with the caravans coming from Persia. Driven to the sea, they could only think of maintaining themselves in a few cities adjoining the coast th that remained to them, and offered to the western men, that flowed into Syria and Palestine thirty years before, only arms to defend the remains of their dominion. That source of arts and industries, that had such a considerable influence on the West, had dried up; besides, it had given us all that it could give.

Note 2.p.212. See Extraits des historiens arabes relatifs aux guerres des croisades, by M. Reinaud. 1829.

Independently of the armed invasions that the Franks had a attempted in 1164, there existed between Egypt and the kingdom of Jerusalem frequent relations; even those invasions were only a result of relations, sometimes friendly but more frequently hostile, established between the successors of Godfrey de Bouillon and the caliphs of Egypt. In 1153 the Christians took possession of the city of Ascalon, which was the bulwark of the Egyptians against the armies of Syria. About the same time a fleet from the coasts of Sicily obtained possession of the city of Tunis, not far from the city of Damietta. Thus the w

western men, who at the end of the 11 th century until about 1125, principally occupied the cities of north and central S Syria, had gradually extended their possessions to Egypt in spite of many reverses. Their establishments were scattered along a line of small depth but very long, and were found at first in contact with the remains of Greco-Roman and Byzantine arts, then later with those of Palestine, and finally those of lower Egypt, i.e., with the arts of the Sassanides, the caliphs, and perhaps even the Ptolemies. One should further not forget that the western men were in the Orient destroyers of cities and of monuments, far more active than the Arabs had been. The latter rarely attacked buildings and built little until the 10 th century; carried off the wealth of the people, but allowed the monuments to remain. We have the proof of this in the Hauran. But the Christians of the West, builders of fortresses and ramparts, left nothing standing. There is every reason to believe, that there existed many edifices in Syria, Palestine and the northeast part of Egypt, which were o overthrown to erect those castles and walls, of which we find again today remains so numerous and imposing. Monuments precious for the study of archaeology must have disappeared thus; but those implacable destroyers did not fail in the Orient or elsewhere to profit by the arts, whose models they annihilated thus. Between the art of Syria and that of ancient Egypt is a void to be regretted. Our sculpture from 1140 to 1160 is perhaps a feeble reflection of the art that arose between that of the Ptolemies and that of the Sassanides, since one finds in our western monuments traces of those oriental arts. The mixture could be made with us, it is true, but some rare fragments in Syria and in the eastern part of lower Egypt equally cause it to be supposed, that this transition art existed from the Dead sea to the mouths of the Nile.

It is certain that Romanesque ornamental sculpture about 1140, notably in Isle-de-France, lower Champagne and near Chartres, no longer had the Greco-Roman nor Byzantine characteristics, so apparent at the commencement of the 12 th century in Languedoc, Provence, Lyonnais, and part of Burgundy and of upper Champagne.

This capital (Fig. 48) from the abbey church of S. Denis,[1] neither has relations with those of S. Sophia of Constantinople

nor with those of the cities of the Hauran, whilh it recalls certain capitals of the great portico of the island of Philae; that as one knows, does not precede the epoch of the Ptolemies. Had the Christians of the West in lower Egypt or on the borders of Syria similar capitals? We cannot say. It is also necessary to remark, that those capitals of the great portico of the island of Philae are all varied in form, a custom quite extended in some edifices of the same epoch, but contrary to the principles of the good Egyptian antiquity. That diversity is found more marked in the capitals of our monuments dating from the middle of the 12 th century, than in those of an earlier epoch. The capitals of the church of Suger differ from each other not only in details, but also in the general forms, a fact neither found again at the beginning nor at the end of the 12 th century. We add that all the capitals of the side aisle of the apse built by Suger nowise recall in such clear fashion certain Egyptian capitals of the Ptolemies. Most rather resemble the Greco-Roman toothed sculpture; a single one is already furnished with crockets with wide and fleshy stems. Some mingle animals with their foliage. Elsewhere in the royal provinces are experiments about the middle of the 12 th century; the sculptors took a little everywhere, in Syria, perhaps in Egypt, in Gallo-Roman monuments; they have recourse also to their inspiration and the study of the flora.

Note 1.p.214. Of the monostyle columns of the side aisles of the apse.

It is another monument that by its sculpture merits all our attention, to determine the moment when the artists abandoned Romanesque traditions. This is the cathedral of Sens. M. Challe at the scientific congress in 1859, on the question proposed by M. Parker of Oxford, claiming for the cathedral of Sens the title of "first of the Gothic monuments." In accord with M de Verneilh, we could not share that opinion. By the system of architecture adopted, but still more by the style of the sculpture, the cathedral of Sens must be later by several years th than the abbey church of S. Denis.

"It appears to me very doubtful," said M. de Verneilh,[1] "that the edifice (the cathedral of Sens) was commenced before the choir of S. Denis, and that in any case it was built much more slowly. In 1163 it is mentioned as a "new"church. It was already

even devoted to worship, for instead of consecrating the entire choir, as at S. Germain-des-Pres, Pope Alexander III was only invited on his passage to bless an altar, that of Ss. P Peter and Paul. Besides, it is known that bishop Hugues de Toucy, who occupied the throne of Sens from 1143 to 1168 "labored much on the cathedral"and nearly completed it. That he notably caused the placing of the oaken stalls, after finishing the choir of the church,"that the good Henry had commenmed." -- But the chronicler who stated this lived in 1294. At that distance he might be ignorant whether the archbishop Henry of France had commenced the cathedral at the beginning or end of his administration, or even whether anything remained from his construction. For Henry as for Hugues, the part that they took in the erection of the cathedral is mentioned immediately after their election. This is their principal work, that is to be cited. Another chronicler, and this time more nearly contemporary, for he stops at 1173, limits himself to stating:- 1122. Daimbert died and Henry succeeded. He commenced to restore the church of S. Stephen. To him succeeded Hugo in 1143."

"One is then free to believe, that far from having been commenced about 1122 or 1124, the cathedral of Sens was really founded only in the last years of Henry of France, or which is the same thing, that it rose above ground only at that epoch."

Note 1.p.216. Annales archoeologiques. Vol. XXIII,p.128.

We shall add that the system of construction, the mouldings (a detail so essential for establishing a precise date), could not belong to 1124 nor even to 1130, the date of the consecration of the narthex of Vezelay; finally, that the sculpture is more advanced that that of the church of Suger in the path traced, i.e., that it tends more to imitating natural objects and to freeing itself from the influences to which the Romanesque was subject from 1090 to 1140. One cannot doubt the slowness in the constrtction of the cathedral of Sens, when he e examines the upper works. The capitals of the transverse arches of the high vaults, those of the triforium, already in great part are impressed by the imitation of the flora, and recall in their composition the capitals of Isle-de-France of 1170, while those of the arches of the side aisles of the

choir but exceptionally permit the appearance of the imitation of natural objects, leaves or animals.

Thus the capital of the arch of the choir that we give here (Fig. 49) differs more from Romanesque forms than do those of the church of Suger; it is more skilfully expanded and more delicate; although its foliage is unnatural and still recalls the execution of Greco-Roman sculpture, it is more free and flexible. Then the buds above the foliage are no longer fanciful winged animals, so common in the sculptures of 1130; they are partridges copied with minute care; the charm and pose of these birds are observed with extreme delicacy.

Without ascending to the triforium, most of the capitals b bearing the arches of the side aisles of the choir of S. Etienne of Sens take the form of foliage, that belongs almost to the epoch of the substructure of the choir of Notre Dame of Paris, i.e., to 1160. Fig. 50 gives one of those capitals, t that no longer has anything Romanesque. Now more of the capitals of the church of Suger so nearly approach the decorative style of the end of the 12 th century. All the capitals of t the sanctuary of S. Etienne of Sens do not have this character, several still reproducing Romanesque details, fantastic animals mixed with twisted foliage. But at all epochs of transition from one style to another, there are backward and advanced artists among the workmen; the same fact can be proved at Notre Dame of Paris. It is necessary to select examples am among those belonging to the new schools, for those give the proper tone. Suger, more than anyone else, was likely to surround himself by the most capable and most advanced artists; he did so for all concerning the construction of his church. Then for his sculpture so near the capital of the royad domain, now could it be more Romanesque than that of S. Etienne of Sens, if the last monument was earlier than his own? It is then difficult for us to place the sculpture of the cathedral of Sens before 1150. That is the transition from that of the church of S. Denis to Notre Dame of Paris.

One can further obtain a correct idea of the difference between the two epochs and of the progress already accomplished at Sens by examining in the two edifices two ornaments similarly composed and placed in the same manner. The north portal of the church of Suger is preserved, except some mutilations;

now the two jambs of the opening are decorated by scrolls in a beautiful style, a fragment of which we give.[1] Here in parallel is a piece of the scrolls that decorate the mullion of the principal doorway of S. Etienne of Sens (Fig. 52). The character of the sculpture of the first fragment is still entirely permeated by the Romanesque manner; the lined stems, recurved and scrolled leaves, toothed and modeled like Greco-Roman sculpture in two dry planes, the unnatural style of these leaves; all still recalls the sculpture of the capitals of the choir of S. Martin-des-Champs, whose piers date from 1130.[1]

Note 1.p.218. It is necessary to note here that the sculptures were made on the yard of that epoch, i.e., before setting. Our Fig. gives two courses of the ascending ornament. One sees perfectly that the junction between the two portions of the o ornament is not made exactly, which is only possible by facing and carving it in place.

Note 1.p.221.See Fig. 44.

But if we devote all our attention to the second fragment, (Fig. 52), one already finds there that style which we have seen adopted in the resumption of the chapter hall of Vezelay in 1160. The same imitation of the leaf of the columbine, although more archaic, the same rounded lobes and modeling, sometimes projecting to recurve, sometimes flat to show the insides of the leaves.[2] The stems are no longer regularly lined, as those of the preceding example, but in long spirals, which indicates a careful study of nature; for if one twists a lined stem, it either breaks or its lines must form spirals to adapt themselves to the curve imposed on it. The attachments of the stems are well arranged, seeking the natural. This beautiful ornament cannot be earlier than that of S. Denis; it is its development aided by .e observation of nature. The date of the ornament of S. Denis is not doubtful, 1137 to 1140. The date of the resumption of the chapter hall of Vezelay can only vary between the years 1155 and 1165; since that chapter hall was built after the narthex, which dates from 1130 to 1132, and that between the years 1135 and 1155 the monks had many other things to do than to build. Besides, the character of the architecture of that chapter hall does not permit placing its construction before 1155 nor after 1165. Then even admitting that the resumption mentioned occurred directly after

the completion of the chapter hall, which is scarcely probable, considering the difference in style, it could only date from 1160 to 1165 at earliest. The scroll from Sens (Fig. 52) approaches much the style of the capitals of archivolts (Figs. 46, 47), although of a character a little more archaic, could not be given a date before the year 1155; but we are led to assign it a later date (1165 to 1170), if we compare it to the ornamentation of Burgundy, lower Champagne and Isle-de-France, whose date is well established.

Note 2.p.221. The scroll that forms a pendant to this imitates the buds of fern at the time they develop.

It is certain that a school does noh come to compare ornaments weth this skill and harmony at the first attempt. The a rather labored beauty of Byzantine compositions had been an i instruction sufficiently powerful to give our artists a first impulse; when they added to that acquisition the study of nature, they reached by a rapid transition, but that one can c follow year by year, so a development of the decorative art, that belongs to the marvellous.

In the scroll of Sens, besides the observation of nature, one also feels a sort of last reflection of oriental influence. In spite of the perfect harmony of the composition, the details are too multiplied, and this ornamentation is suited rather to cast and chiseled metal than to stone. The feeling of scale and of size is not yet developed; one feels the entire seeking of the artist in his work, but which does not yet receive the superior impulse suited to make also the details of an edifice concur in an effect of the entirety.

From the moment that tha sculpture of ornament was no longer entirely a conventional art reproducing traditional types or those produced by the reminiscences of earlier arts, so that if it could find its inspiration in the flora, a more perfect harmony could be established between the details and the entirety. The identity in the nature of the composing elements gave the artists ne facilities for obtaining that harmony v vainly desired by the different schools during the first two-thirds of the 12 th century. The restrained spirit hostile to all exaggeration, of the artists of Isle-de-France was further suited to profit by the resources supplied by recourse to the productions of plants. Indeed in the future centre of the Fr-

French nation was rapidly developed this new art of ornamental sculpture, whose influence we have emphasized in Art. Flore, and of which one rarely finds so complete an example as in t the art of ancient Egypt.

It appears that the lay French school of the end of the 12 th century desired to drop the traditions accumulated during the Romanesque period. In a few years all not inspired by the flora in sculpture disappeared; no more beads, imitations of laces and interlacings, billets, rows of those water leaves imitated from antique monuments. The local flora henceforth dominated wa. first the starting point of the school. If there are resistances to that enthusiasm, they are so rare and so visible, that they only confirm the impulse given. The are e evidently the works of backward artists. Thus although the choir of the cathedral of Senlis was only built from 1140 to 1165; when already at that epoch at Sens and at Noyon the sculptors were seeking inspiration from the flora, one can recognize in the sculpture of this choir of Senlis the work of artists not yet permeated by the new ideas. The sculpture of the capitals of the chapels and of the sanctuary is almost Byzantine (Fig. 53),[1] if not in general form at least by the details. In the choir of Notre Dame of Paris, begun in 1163 and finished before 1190, the new school seems to have fully adopted this new principle of decorative sculpture. The flora of the fields is not the starting point, but it assumes a monumental appearance, and the sculptor does not restrict himself to an actual imitation; he composes, he seeks by preference the smallest buds of plants, and by the aid of that element, further very beautiful, he succeeds in producing works of sculpture of an appearance both strong and flexible, with a broad and graceful curvature, that places it on a level with the best antique conceptions, yet without resembling them.

Note 1.p.222. One of the capitals of the cylindrical piers of the choir.

In adopting this new principle, foreign to the traditions, as for the composition of the details of the ornamentation, the lay school of Isle-de-France gave to sculpture its place. Henceforth it does not extend by chance and according to caprice over the monuments, as but too frequently occurred in R Romanesque architecture. It fulfils a definite part for both

statuary and ornament. However rich may be a monument, the artist takes care to leave repose and quiet surfaces. Sculpture combines with the structure, aids in making this understood and seems to contribute to the stability of the work. We have stated in Art. chapiteau, how the artists of the lay school at its origin composed them to not only give them the appearance of strong supports, but to make their decoration useful and necessary. For the bands, cornices and corbellings, this principle is rigorously followed, and it is not one of the least merits of this French architecture, logical in its structure, but also logical in the decoration covering it, always earnest, since it never places an ornament without its being required by some necessity, so to speak.

One can refer to the Arts. Bandeau, Chapiteau, Clef, Corbeau, Corniche, Crochet, Cul-de-Lampe, Fleuron, Galerie, Griffe, T Tapisserie and Tympan, if he desires to prove the judicious use of sculpture in the monuments of the lay school from 1170 to 1230. There is no more evident symptom of the sterility of the ideas of the architect, than the irrational abundance of the sculpture. Sculptured ornamentation is most commonly only a means of concealing the defects of harmony or of proportions, only an embarrassment of the architect. By occupying or thus seeming to occupy the eyes of the passer, one conceals poverties or shocking defects in the composition, and even awkward and forgotten construction.

The masters of our beautiful epoch of art reasoned sincerely on the ornamentation as on eve y other essential part of the structure; for them this ornamentation was not a mask cast over the miseries and vices of the conception. Knowing well what they desired to say, and always having something to say, they did not conceal the void of ideas beneath flowers of rhetoric and commonplaces. The sculpture is frequently so well joined to the architectural forms, that one does not know where the work of the stonecutter ends or that of the sculptor commences. The stonecutter and the sculptor concur together in the work, without being able to establish a line of demarcation between the two kinds of work. These ornamental sculptures further were always cut on the yard before setting and not on the building. Thus it was necessary for the master to combine all his effects before the building was erected, acc-

according to the height of the place and the scale adopted. T This method also had the advantage of giving to the sculpture an attractive variety in the execution; of permitting the finishing with more care, since the artisan turned his block of stone at his pleasure; of avoiding the monotonous and excessively wearisome appearance of those decorations on our modern facades, serrated as if by a machine. Each artisan was thus interested that his piece should be distinguished from all others by a more perfect execution; and indeed on our monuments of the middle ages by the lay school, one always observes, -- as it occurs on the beautiful monuments of antiquity, -- certain parts of a frieze or cornice, certain capitals, that are of superior execution among all others. Subject to the construction, a joint or bed was never awkwardly cut across an ornament; that would be impossible, since the work of the sculptor is done before setting it. Nothing is more satisfactory to the mind and the eye than this perfect and absolute accord between jointing and sculpture; nothing better gives the idea of a work well matured and reasoned, of an art certain of its methods and of its means of execution. For example, seeing now are composed the angles of the buttresses of the w western facade of Notre Dame of Paris at the level of the great gallery, how those great crockets, animals, cornice and i its balustrade surmounted by figures, combine intimately with the lines of the architecture, forming a bold outline against the sky, one can ask whether the art of grand monumental decoration has ever been carried farther; if more complete union ever existed between the two arts of architecture and sculpture to produce a desired effect, indeed wished in advance, since all those enormous blocks of stone were cut on the yard before being set at the height of 131 ft. In presence of such results, there do not appear to us poor apprentices erecting our buildings somewhat by chance, and seeking to decorate them later by a swarm of sculptors attached to their walls; undoing what we have done, placing buttresses here and groups there, supporting them or replacing them by pots or ornaments, that fill all books of engravings printed during two centuries!

We have just stated that in seeking in the flora the elements of a new and original ornamentation, the school of sculpture of the end of the 12 th century knew how to give its imi-

imitations a monumental appearance, yet far removed from realism. Those attempts already are systematically pursued in the lower part of the choir of the cathedral of Paris for all capitals of the isolated cylindrical columns, while those of the engaged columns of the second side aisle are still permeated by the Romanesque style of 1140.

Tha capital of which half is given here (Fig. 54), and that belongs to one of the great columns of the sanctuary, clearly indicates the method adopted by those precursors of the great lay school of the 13 th century. The general composition is derived from the Roman Corinthian capital and its various modifications, both during the late empire and in the Romanesque period. But the masses of the leaves, instead of being conventionally divided, imitating the work of the Byzantine sculptors or of the beginning of the 12 th century, is divided into recurved leaflets with wide stems, that recall the first developments of the buds of plants. The large manner a adopted in the execution, the delicately rendered curves of the stems, the abundance of sap that seems to swell that stone vegetation, all that is evidently the result of an enthusiastic observation of the plants. And indeed at Notre Dame of Paris first expands monumental plant flora. Everywhere at the same epoch, i.e., from 1163 to 1170, where we find delicate and careful imitation of the flora of the fields, as on the ornaments of Sens and of the chapter hall of Vezelay, where there are imitations of those Greco-Roman ornaments more or less well understood. The sculptors of Notre Dame derived their inspirations from the fields, and thus compose a style generally adopted in the North of France until the first years of the 13 th century.

Soon the school of Isle-de-France is no longer contented with these ornaments borrowed from the spring flora, it develops the stone buds; but in taking the leaf, the charm of the plant having attained its development, it retains the appearance of the plant in its translations.

Thus this scroll on an archivolt taken from the portal of the Virgin on the western facade of Notre Dame of Paris (Fig. 55), again recalls the composition of the scroll of Sens (Fig. 52). But the execution is broader, the arrangement of the masses is clearer, and the details are less labored; further, the

Romanesque tradition is absolutely abandoned, nature being b better observed and more closely followed. This is not a copy of a plant. These leaves, stems and their junctions do not e exist in the flora, and yet the ornament has all the charm of a plant. To know how to give to a composite object all the a appearance of an individual plant or real animal, that is art in the true meaning of the word. The same observation can be made concerning the beasts. Although the sculptors of the end of the 12 th century were already more sparing of representations of animals in their ornamentation than their predecessors,[1] yet when they thought it necessary to compose them, they knew how to give them individual features, to the point that one is quite disposed to believe them copies from nature, although they most commonly belong to the fanciful realm.

Note 1.p.228. There exists in a single representation of an animal on the capitals of Notre Dame of Paris, although at t that epoch (the second half of the 12 th century), they were still sculptured on many other edifices).

For us the climax of the sculpture of ornament as of the statuary of the middle ages is placed at this moment when t the Romanesque tradition has disappeared, and when the search for realism has not yet imposed its requirements. This brilliant period of the French school lasts about 25 years, from 1 1190 to 1215. This is the epoch of the construction of the n nave and of the lower part of the facade of Notre Dame of Paris, of the cathedral of Laon, of the lower part of the choir of the cathedral of Rouen, of part of that of Lisieux, the c choirs of the abbay churches of S. Remi of Rheims, S. Leu d' Esserent, of Eu and of Vezelay, etc.

Indeed at that moment occurred a marvellous development of art, The new school extended its influence in the entire part of France North of the Loire, Burgundy and Nivernais to the borders of Maine. Yet each province retained something of its originality. Decorative sculpture, while following a general impulse, developed according to the aptitudes peculiar to each country. Broad and plant-like in Isle-de-France, energetic a and cose in Burgundy, the sculpture was delicate and careful in Maine and Normandy. Those beautiful ornaments from the cathedral of Lisieux (Fig. 56) reveal the delicate taste that then prevailed within the last province.[2] The sculpture of

ornament tended to goldsmith's work, and in spite of the beauty of execution lacked in those provinces the breadth of style and the beautiful harmony in effect, that we find in the sculpture of Isel-de-France. The inspiration of nature is less frank and bold, and especially less original. These different aptitudes must persist much later, and the sculpture of Normandy, Maine,and Anjou never attained the amplitude of that of the cathedrals of Paris, Laon and Amiens; it retained labored details and a meagreness, that in the 14 th century degenerated into dryness. On the contrary, in Burgundy the sculpture of ornament advancing in the more real imitation of the flora, attained to exaggeration; the ornament seems to overflow, unable to restrict itself within the limits fixed by the architecture. Frequently out of scale, its importance injures the entirety. Then it is necessary to return to that centre of s schools, that developed in Isle-de-France, to find that just and wise measure, that is the mark of enlightened taste and sure judgment. Not only the principle of the decorative sculpture is modified within those peoples of two or three provinces of France, but also the system of the architecture, from the construction to the proportions of the mouldings. There is a fact so exceptional, so abnormal in the history of the arts, that it merits explanation, as far as it can serve as an examp Assume that today in the department of the Seine and some adjacent departments, architects place themselves at the head and have the talent to produce a novel art, both in construction and system op proportion, conceived after methods entirely novel, their projects would never even leave the office of registry, and if they did escape, they would be caught on one of the many wheels of the administration, by which they must pass.

Note 2.p.229. We owe the drawings of these fragments to the courtesy of M. Souvogeot.

The conditions of freedom for artists, as artists, are not those of the citizens. A social state may be very oppressive for the citizen, but very favorable to the development of liberty among artists. The contrary is true. When artists in society form a sort of caste, whose numbers are equal, they find themselves in the best conditions for the free development of art. As a caste, they acquire within the civil order a marked

preponderance, particularly if it be divided as the feudal o order was. As individuals, the principle of every caste being the equality of the members forming it, , the opposite of a hierarchy, the artist retains a freedom of action from which we are very far removed.

The lay school of artists was formed after the second half of the 12 th century, and was a natural result of the development of the municipal spirit, so powerful at that epoch. The regulations made in the 13 th century to give a legal existence to the guilds are the proof that those guilds acted, for t the law never precedes the fact; it recognized that to be the rule, which had already produced consequences whose extent could be appreciated. Once having left the monasteries, art settled in the workshops, in certain families, whose members as artists neither were nor could be subject to any hierarchy. Those shops and families united, discussed the collective interests of the guild, established them in opposition to the feudal power! but could not pretend to impose the methods of art among themselves, for those masters of shops were on the basis of perfect equality among them, and had no families or dignities of a nature to give them a predominant authority in the guild. One undershands how such a social state must be f favorable to the development and to a very rapid progress of art. Experience or the genius of each member enlightened the guild, but imposed neither doctrines nor methods. Thus the art of that period is the faitnful mirror of that social condition of the artists. An experiment succeeds, at once one sees its results disseminated, immediately followed by an improvement or a new attempt. It is very certain, -- and we have the proof of thi in the 13 th century, -- that art was prachised in certain families, the father instructing his son or nephew. Knowledge was thus transmitted in the guilds composed of a n number of members having all the characteristics of a caste. This knowledge was regarded as the privilege of the caste and was not divulged to the public; its uninterrupted transmission in the workshop or the family, from master to apprentice, father to son, explains why we possess no treatise written on art matters in France from the end of the 12 th to the 16 th centuries. Monks could wri e their treatises, and we possess one of them, that of the monk Theophilus, which very probably

dates from the middle of the 12 th century, occupied with painting, stained glass, jewelry, joinery, etc.;others must have been written in the monasteries, because it was necessary to transmit the methods, either from one monastery to another, or to the separate schools of the monastery. But the lay members of the guilds of artists or artisans, not only did not need to place on paper the result of their experience and knowledge, but they must even avoid to write anything, so as to not give the public the recipes and the methods adopted in the shops. The Album of Villard of Honnecourt dates from about 1250, and is only a book of notes made everywhere and about everything, from the processes of drawing to the making of unguents, but it does not have the character of a treatise intended to perpetuate methods or practical means. Villard discusses and proposes questions; his book is a memorandum, but nothing more.

That social state of lay artists at the end of the 12 th century is known, and proves to us how those guilds must necesseraly act within the sphere absolutely free; for unless by suppressing the guild, how could be imposed on it a taste or methods? It was forced to accept what it would do, to follow the style and procedures that it pleased to adopt, whose value it discussed within its entirely republican organization, where the voices had only purely moral authority, due to lon experience, genius or simple personal merit. A similar organization could alone change within some years the appearance of the arts, without any civil or ecclesiastical power (if it had the will), being in condition to arrest the given movement. But what impresses a c aracter of great natural value on this establishment of the lay schools of the 12 th century, is that their first care was to break with the past; whether this past was the Roman, whose monuments were not wanting in France, or it was the Romanesque more or le s impregnated by Greco-Roman or Syrian arts, the lay schools rejected them in construction, appearance and masses, proportions and decoration. We do not believe it useful, having reached the eighth volume of the Dictionary, to reply to the objection sometimes made: that G Gothic artists did not copy Roman architecture because they were unable to imitate it, too ignorant to comprehend its values. What they attempted and retained was indeed wiser than would have been an imitation of Roman arts. Besides, after

Romanesque art it was easier to return to Roman art, which d differed so little from that, than to wander from it. If the school strayed farther than ever, if it even broke with the traditions of the antique arts fused with the Romanesque, this was because it had the will, and that this will was based on a reason superior to any other.

Here is what is to be well established, if one desires to understand something of this art movement of the end of the 12 th century. This was an active and violent reaction, both against the antique Roman domination as well as against the theocratic and the feudal systems. This school being once mistress in the domain of art, intended that nothing in the arts should recall a past, that it no longer desired. Thus with what enthusiasm the great cities of the North hastened to tear down their old cathedrals to build new ones! It cost them nothing to efface the last trace of that Romanesque art developed within the monastic establishments.

Whether the bishops and lords thus understood, that the peoples of the cities had not fixed their ideas with this rigor, this is certain; the monuments are there; their character and the details covering them, and the construction speaks for t those first guilds of lay artists and artisans, who certainly did not by chance and without a matured reason, abruptly break with the entire past. Freemasonry and the trade unions of the carpenters are the last remains of those lay associations, a sort of beginning, whose results were long presented as the e expression of barbarism and ignorance, on the whole are only the manifest symptom of the first efforts of a nation, that recognizes itself after such successive servitudes, desires to constitute itself, and dates its enfranchisement and the reason of its national spirit to the monuments due to its own genius, borrowing nothing from earlier centuries. Thus they very rarely signed their works, those fisst masters of the lay school. For what good? They left on those monuments the imprint of the national genius, freed from so many decrepit traditions, and that signature possesses value.

If those artists, after having established a new principle of construction, after having subjected to that principle an entire system of proportions,,mouldings and drawings, had retained something of Romanesque decoration, in the eyes of the

multitude they would still have been bound to Romanesque art. Thus they make no concession; Romanesque ornamentation no longer exists, and to form a new one, they carefully study the plants that grow in the fields and forests. Romanesque statuary is relegated to the past; they observe nature and regard it under a new aspect, no only its solid form do they seek to reproduce while idealizing it, but the moral feeling of t the individual.

Once in that path, so rigorous was the constitution of the guild, that its entirely republican organization must push it forward without stops. Unfortunately in the affairs of art, progress quickly elevates us to the climax and causes us to descend from it; as with the Greeks, after sculpture idealized nature, it certainly desires to approach it and falls into s seeking realism. Yet there comes to this school what occurs to all constitutions based on liberty of thought, even when this seeks the quintessence in everything and forsakes the ideal, always slightly vague, for the real; art long maintains itself at a great height, and the execution never falls into barbarism; for barbarism in conception or even in the execution of works of art, coming after a period of splendor, is always the result of the subjection of thought. We have the sad proof of this in the Roman monuments. At the end of the empire, without any interruption in the works, without the s suppression of the teaching of art, without ceasing a single day in sculpturing or building, the execution fell so low, t that it only inspired disgust, and it almost made desired the invasion of actual barbarians, ye young and vigorous, having a future before them, for effacing the traces of those senile arts that could produce nothing more.

While the school of Isle-de-France caused that radical revolution in the art of sculpture, those of upper Burgundy and of Poitou floated between Romanesque traditions and these innovations, whose importance they did not even comprehend; these provinces had further raised Romanesque art to a superior degree of perfection, both in construction and decoration, and abandoned only with regret the methods or style of ornamentation, that had left numerous examples in the country. Thus at Poitiers, the parts of the cathedral built during the last ye years of the 12 th century cause to be perceived the not doubt-

doubtful reminiscences of that decorative Greco-Roman sculpture of Syria, beside ornaments borrowed from the local flora. The capitals of the great arches of the side aisles of the n nave, built from 1190 to 1205 present that juxtaposition of t the two styles.

As for the school of upper Champagne, which comprises the departments of Haute-Champagne, Haute-Saone and a part of Cote d'Or, its centre was at Langres. This school had adopted early a style of sculpture, that sensibly approached the Burgundian style, but with an addition of more pronounced Gallo-Roman traditions. Possessing beautiful materials, this province erected edifices, whose execution is generally very good. Its architecture follows the series of elevated plateaus extending from Langres even to Lyons, passing by Saulieu, Beaune, Autun, Paray-le-Monial and Chailieu. But on that line may be distinguished two schools of sculpture; that of upper Champagne, whose centre is at Langres, which retains until quite late Roman traditions, and that of Burgundy, which promptly frees itself. Yet in following the Romanesque style, the school of sculpture of upper Champagne at the end of the 12 th century as evidently stimulated by the progress of the schools of Isle-de-France and of Troyes, and seeks a broader execution and wiser and firmer modeling without frankly resorting to the flora. Those ornaments (Figs. 57, 58), that came from the cathedral of Langres, (end of the 12 th century, indicate the indecision of this school, hesitating between Romanesque traditions and the new principles adopted by the sculptors of Isle-de-France.

The fragment (Fig. 57) of a capital is still entirely Greco-Roman, but with a more delicate modeling, nearer nature; the ornament (Fig. 58) of an archivolt is Romanesque in composition and approaches the flora more in execution. It is true that this archivolt is a little later than the capital (Fig. 57), and dates from the first years of the 13 th century; but then the flora, in the sculpture of Isle-de-France, remained mistress and inspired all compositions. Then but timidly the school of upper Champagne followed the movement; which could be explained by the vicinity of the vast monastic establishments, that had so long been the light of those provinces. For it must be observed that near great abbeys, the new style due to the

lay artists extends with difficulty. The abbey of Vezelay forms an exception to this rule, and on the contrary seems to rival the abbey of S. Denis up to the end of the 12 th century in abandoning the Romanesque tradition. The sculptured ornamentation of the choir of Vezelay, whose construction dates from about 1190, is very advanced in construction, and is inspired with a true passion for the flora. One does not even note in that sculpture the constant respect for monumental a art so profoundly impressed in that of Notre Dame of Paris. Those artists of Vezelay have not that judicious choice of p plants that serve them as examples, and do not adhere to the scale as the Parisian sculptors knew how to do. Certain ornaments have a breadth and exaggerated simplicity, while others already reproduce in a sort of labored way the flexibility and details of the plant. But the Burgundian sculpture (and the abbey of Vezelay initiated the arts of architecture in that f province), in spite of its very considerable value, sins by incontinence. Until the 12 th century, its works have something spontaneous, that resembles a flowering in a virgin soil; they grow with unsubdued vigor, that very frequently produces examples of incomparable beauty. Thus at Vezelay the capitals of the monolithic columns of the sanctuary (Fig. 59) have a b breadth of style and firmness in execution, which gives them exceptional value in the midst of the other sculptures. That would be for the best if all the decoration were so treated; but beside those masses, so simple and so largely curved, are found capitals with sculpture treated at a different scale.[1]

Note 1.p.235. Capitals of the triforium.

In the execution the monumental character is observed in both these examples; in composition in the same interior, the monumental character, that essentially holds to the observation of the scale, is not respected. In no edifice of Isle-de-France and of the same epoch, at Notre Dame of Paris, Laon, S. Quiriace of Provins, etc., can one note this neglect of the scale. But if we limit ourselves to the skill of the artist, no school excels the Burgundian. There is a grandeur in the drawing, amplitude in the modeling, delicacy in the strokes of the chisel, that nothing approaches at that epoch. Besides, this school only cuts its ornaments in hard stone; it abandons soft materials about 1180, to resume them only about 1230. Soft

stone, even fine, can indeed lend itself with difficulty to the precise cutting of that sculpture, that can be compared in clearness to the beautiful Greek ornamentation on marble, and that has the advantage of being broader and better understood in decorative effect. We do not know if the Greeks executed ornamental sculpture at a great scale ample in composition, since the sole examples that remain to us from generally small monuments, appear meagre and flat when applied to an edifice. But for execution, the chisels of the artists of our best French schools of the end of the 12 th century equal the purity of Greek chisels. To produce the desired effect by the aid of the simplest and least expensive means is certainly t the problem to be solved by the architects of all times. To invent a system of ornamentation tha lends its aid to architecture, whether this concerns a humble edifice, as well as a palace or a cathedral for a great city, was to place art within the reach of all, and not to make it the enjoyment of some privileged persons. Now if one takes the trouble to pass over two or three of our provinces, he will soon recognize that the poor village church, the smallest hospital belonging to this period of rebuilding, possesses a sculptured decoration in perfect harmony with the construction, and that this ornamentation (sometimes of great simplicity) always has the advantage of speaking to the eyes a known language. In this sculpture the peasant and the lord find forms familiar to them, details inspired by the plants that cover their fields, always composed with grace and skill.

Arranged with sobriety on the parts of the construction alone suited to receive them, the ornaments are varied but subject to the law of unity by their common origin, and produce the greatest possible effect, not only by the contrast between their richness and the true simplicity of the construction in the midst of which they are palaced. The place assigned to the ornament is nine-tenths of the effect it produces, and the artists whoin our churches of the end of the 12 th century, sc sculptured those broad capitals on columns at a very moderate height, well knew what they were doing. Thus that rich series around the edifice attracting attention, did it dispense with all other decoration? It sufficed in some places, some points of the elevated parts, such as the capitals at the imposts of

stone, even fine, can indeed lend itself with difficulty to the precise cutting of that sculpture, that can be compared in clearness to the beautiful Greek ornamentation on marble, and that has the advantage of being broader and better understood in decorative effect. We do not know if the Greeks executed ornamental sculpture at a great scale ample in composition, since the sole examples that remain to us from generally small monuments, appear meagre and flat when applied to an edifice. But for execution, the chisels of the artists of our best French schools of the end of the 12 th century equal the purity of Greek chisels. To produce the desired effect by the aid of the simplest and least expensive means is certainly t the problem to be solved by the architects of all times. To invent a system of ornamentation tha lends its aid to architecture, whether this concerns a humble edifice, as well as a palace or a cathedral for a great city, was to place art within the reach of all, and not to make it the enjoyment of some privileged persons. Now if one takes the trouble to pass over two or three of our provinces, he will soon recognize that the poor village church, the smallest hospital belonging to this period of rebuilding, possesses a sculptured decoration in perfect harmony with the construction, and that this ornamentation (sometimes of great simplicity) always has the advantage of speaking to the eyes a known language. In this sculpture the peasant and the lord find forms familiar to them, details inspired by the plants that cover their fields, always composed with grace and skill.

Arranged with sobriety on the parts of the construction alone suited to receive them, the ornaments are varied but subject to the law of unity by their common origin, and produce the greatest possible effect, not only by the contrast between their richness and the true simplicity of the construction in the midst of which they are palaced. The place assigned to the ornament is nine-tenths of the effect it produces, and the artists whoin our churches of the end of the 12 th century, so sculptured those broad capitals on columns at a very moderate height, well knew what they were doing. Thus that rich series around the edifice attracting attention, did it dispense with all other decoration? It sufficed in some places, some points of the elevated parts, such as the capitals at the imposts of

the vaults. And the crowns, to give the interior of a nave t the appearance of richness.

When one desires to render the account of the part given to the sculpture of ornament in the edifices of the middle a ages of that epoch, one is much surprised if he compares these edifices to those erected today, over which the sculpture is distributed without its being possible to give the reason for such profusion, nor to divine why a certain ornament is placed here or there, a the ridge or the base, in the interior or on the exterior.

Further, in the monuments due to our beautiful schools of the middle ages, the sculptured ornamentation is not treated in the same manner in the open air or beneath the vaults or ceilings of a hall. Externally struck and profiting by the direct light of the sun, it proceeds by planes clearly marked; while in the interior, taking into account the diffused light, it adopts a softer modeling and avoids too strong projections.

From the day when the lay school took possession of the flora to compose its sculptured ornaments, it must gradually approach realism. First interpreted, plants are soon imitated. At a distance of a few years, the advance toward actual imitation is sensible. That progress of an art that follows a logical development is furnished with precious instruction. The primitive ornamentation of the lay school during the last years of the 12 th century, with such perfect execution and such a delicate style, maintaining itself between the monumental r requirements and the observation of nature, lends itself with difficulty to grand ornamental sculpture, because even of the delicacy of the accepted principles. Charming on the capitals, jambs or tympanums of doorways, placed near the eye, it loses a great part of its value at the tops of edifices. Increasing the dimensions of the monuments at the beginning of the 13 th century, the artists take a larger scale for their mouldings and their ornaments. Then one sees the sculptured flora unfold, and it is again by the observation of nature that sculptors satisfy the requirements of the scale. For it is to be noted, that to make it grand -- we say grand and not great -- in sculptured ornamentation, it is to nature alone that one can have recourse. All conventional ornament, like the greater part of Roman and Romanesque sculpture, cannot be enlarged with im-

impunity. In increasing the scale, one then falls into heaviness, then into deformity. We modern artists have the feeling of that difficulty; so the pseudo-Roman ornamentation they h habitually adopt is never at a great scale, and the sculptures placed at 131 ft. from the ground reproduce the system, modeling and scale of the ornaments that decorate the substructure.

In recurring to the flora, the masters of former times left themselves the resource, not only to infinitely vary their c compositions without abandoning the unity, but of adopting t the scale suitable for the plane.

It is necessary to see how they knew, for example, how with he same leaf to compose a frieze 0.65 or 2.0 ft. in height, and how they found in nature itself the elements suited by r reason of dimensions or different locations. From this point of view the sculpture of the ornament of the facade of Notre dame of Paris is a work of genius, although that edifece was not built at one spurt. In rising on the edifice, the ornamentation increases in scale and is singularly simplified in the fashion of interpreting the flora; for we observe that by a law that suffers no exceptions during the first half of the 13 th century, the larger the scale of the ornamental sculpture, the more the details are sacrificed to the masses. We n have made that observation in regard to the statuary. The small ornament placed near the eye is very detailed, and very finely modeled: the colossal ornament is simple and broad, th the masses are accented and the projections are strongly felt.

The western facade of the cathedral of Amiens in the old p parts furnishes beautiful examples of that harmony of effects. The band placed beneath the gallery of the kings has a height of 91.9 ft. abowe the place and terminates by a foliage scroll of which Fig. 61 gives a fragment, this band being 1.0 ft. m high. The upper frieze of the same facade beneath the cornice is placed at 14_.0 ft. from the ground, and is decorated by an alternation of crockets and of broad fig leaves (Fig. 62), a and this frieze is 2.0 ft. high. One will note the difference in composition and modeling between these two ornaments. The first is delicately modeled and furnished with details, being still sufficiently near the eye to allow it to seize all parts; the second is placed at the top of a wide facade, is of greater dimensions and is remarkable for its simplicity, breadth,

the clearness and boldness of the modeling.

This sculpture dates from about 1230. Then the inspiration from the flora already tends to realism, but still with a profound knowledge of effects. Then also the general forms of t tne architecture are mingled with the sculpture. We find examples of this mixture on that same facade of the cathedral of Amiens, in the arcade of the lower gallery.(Art. Galerie, Fig. 12). The imposts of that arcade, which would have appeared v very meagre if reduced to tneir geoometrical drawing, are reinforced by ornaments and animals that give them a powerful appearance, which arrests tne eyes on those principal points, and which form a composition larger and bolder. (Fig. 63).

This example is remarkable for more than one reason. It is already not easy for the designer to combine this mixture of architectural forms, ornaments and animals; but the design b being given, it is still less easy to cause it to be interpreted by the workmen, since this composition set in place demands the concurrence of tne jointer, stonecutter, sculptor of ornaments and figures, hoister, and finally the setter. The pieces, whether sculptured or not, being all completed before s settingl -- do not forget that,-- it is not necessary to be versed in the practice of building to comprehend the difficulties of hoisting and setting of an impost with this cutting,-- for it cubes no less than 53 cu. ft.,-- presenting no hold, since all its faces are dressed, and the front is covered by strongly projecting sculptures. With out perfected machines, we do not always succeed in placing stones simply blocked out end without projections. Then how could those builders of the middle ages undertake to hoist and place such blocks entirely finished, without injuring the mouldings and reliefs? How protect them during the execution of the upper parts? There is matter for meditation, particularly if one considers the extraordinary rapidity with which certain edifices were erected. [1]

Note 1.p.241. This is not the first time that we have mentioned the activity of the constructors of the middle ages. The nave and a great part of the facade of Notre Dame of Paris were were erected in ten years at most; the nave of the cathedral of Amiens and the gable of the facade, from which come the f fragments above, were finished in six or seven years. The castle of Coucy, so important, was built in a few years. Because

a great number of those structures were interrupted for half centuries for want of resources, or because of public misfortunes, then resumed and interrupted, and then continued, one concludes that they were erected very slowly. That is an error; always when building in the middle ages, men built very quickly.

It was at that epoch, at the moment of the development of the lay school, from 1210 to 1230, that the ornamentation fully identifies itself with the architecture. The facades of t the cathedral of Paris and that of Amiens (old work), certain parts of Notre Dame of Chartres, of the cathedral of Laon, notably the towers of the western facade, show with what harmony in composition the masters knew how to connect the sculpture to the architecture, and with what skill the workmen interpreted the conceptions of their masters.

Then existed several series of workmen trained for this work, which we can obtain today only with the greatest difficulties. There were the ordinary stonecutters, task workmen, who from the drawing of the jointer, cut the stones with plain surfaces; more skilful workmen made the mouldings; then came the image-cutters, who cut and sculptured the stones like those that we present in Fig. 63. But all those workmen of different merit understood drawing, something that our sculptors today do not generally know. This method of procedure is proved:- 1, by the marks of the task workmen; 2, by the nature of the cutting and finishing, that differs in the three cases. The marks of the taskers of the mouldings in the same edifice are not those of the taskers of the facings. As for pieces bearing sculptures, the finish is much finer and especially le s broad; then they have no marks. Blocking out these pieces was done by the ordinary stonecutters, which is demonstrated by certain fragments not sculptured and set as they were by necessity.

It does not appear that the cutters of images used models; for in the representations of this sort of works, that are f found on stained glass, in vignettes of manuscripts and on r reliefs, models are never shown, but merely surfaces. Besides, those sculptors never repeating exactly the same motive, it is evident that they did not follow a model. Even in current ornaments, like the leaves or crockets of bands and cornices, each ornament is treated according to the width of the stone,

of
and the twenty leaves of similar type, two are identical.

For running ornaments, it is evident how they proceeded. A master makes a leaf, crocket or other motive, to be repeated on each piece; then the workmen freely copy this type. This method is shown by the presence of pieces among the others, executed with rare perfection and by skilful hands. When those pieces were exceptional, like the great capitals, gargoyles, or somewhat complicated compositions assuming a certain importance, they were entrusted to those master cutters of images. Much of the sculpture of the Romanesque epoch was done on the building, i.e., after blocking out, which is indicated by joints passing across ornaments and sometimes even figures. But the lay school rejected this method until the 16 th century, i.e., while the guilds retained their organization intact. Each workman finished the object entrusted to him. A stonecutter or a cutter of images never ascended the building. He worked on his own banker and completed the piece, which was then removed by the hoister and set by the mason, who alone remained on the scaffold. One cannot deny that such a method must give the foreman more facilities for maintaining order in the work, avoiding obstructions and consequently chances of accident, permitting great rapidity of execution, from the moment that the first organization was good, and that the architect had foreseen all in advance; it was indeed necessary for it to be thus, so that all these wheels could act. In this respect, there is no vanity to be desired from the progress that we have made.

At the moment of the appearance of the lay school, the animals, so common in Romanesque ornamentation, reappeared in t the external decoration of edifices. Besides the flora, they produce a fauna having a very characteristic appearance. The animals found in the sculpture of 1210 to 1250 are of two sorts; one is copied from the local fauna, and from some species, that as a luxury were kept as individuals in their palaces, such as lions, panthers, bears, etc.; the others seem to belong to the fabulous kingdom so well described in the books of animals. These are the griffin, wivern, "caladre" and the "p peredixion,", harpy, siren, basilisk, phoenix, "tiris," dragon, salamander, animals to which those animal books assign the s strangest qualities or instincts. Why did those real or fabu-

fabulous animals come to place themselves thus on the external surfaces of the edifices, and particularly on our great cathedrals? One should not lose sight of what we previously said concerning the tendencies of the lay school, that erected those monuments. These were a sort of summary of the universe, a real cosmos or encyclopedia, comprising the entire creation, not only in its visible form, but in its intellectual principle. There again we find the faint trace still visible, of the splendid pantheism of the Aryans. The old Gaulish spirit thus pierced through Christianity, and returned to its racial traditions, crossing a a bound Gallo-Roman antiquity. Christian dogma dominates, it is true, all those traditions retained in a latent state for centuries; it regulates and takes possession of them, but does not destroy them. The animal books, that were in such vogue at the end of the 12 th and until the middle of the 13 th centuries, even the moment when the lay school developed, these animal books scattered over our cathedrals and participating in the universal concert, seem to be a last gleam from the mos ancient ages of our race. All that is very corrupt, much mixed with the fables of Pliny and the opinions of the last pagan antiquity, but does not fael to allow local traditions to appear, with many more ancient. This is not the place to discuss that question, and we only occupy ourselves with the fact; now the fact is the development of t those animals on the exteriors of our great cathedrals, on t those monuments where the entire order, natural and supernatural, physical and immaterial, develops as in a book.

According to the animal books of the 12 th and 13 th centuries, each animal found there is a symbol. Thus for example the phoenix, that burns by collecting the rays of the sun and is reborn from its ashes, represents Jesus Christ sacrificing himself on the cross and restored to life the third day. The phoenix is described by the ancients, but it is difficult not to recognize in this myth the Agni of the Vedas. That among so many elements left by Roman antiquity, the lay school of t the 13 th century has especially collected these fabulous animals, has given them a symbolical form, has even made myths of them, appropriating these myths for the Christian idea, is not this a sign that these representations recall local traditions still existing? Is it not natural that the clerics re-

recognized the still living power of those traditions, and h have sought at least to give them a Christian symbolic sense? Is it not probable that the bishops that presided over the c construction of the grea cathedrals permitted the representation of those transformed myths on the exteriors of religious edifices, but have forbidden to them the interiors of sanctuaries because of their doubtful origin? And indeed, if these animals abound on the facades of the cathedrals of the beginning of the 13 th century, they are absolutely wanting in the interior with rare exceptions. Not a single animal appears in the enternal sculptures of Notre Dame of Paris or of Notre D Dame of Amiens. One meets with some on the capitals of the n nave of the cathedral of Rheims. Now these three cathedrals, and particularly tha of Paris, present on the exteriors a w world of real or fanciful animals.

That unnatural fauna possesses its well characterized anatomy, which gives it the appearance of reality. One would believe tha he sees in those stone beasts a last creation, but proceeding with the logic imposed on all natural productions. (Art. Animaux). The sculptors of the 13 th century produced in that kind of art works of incontestable value, and without enlarging too much on those works, we shall give here as a s specimen the head of one of the gargoyles of the S. Chapelle of Paris (Fig. 64), that certainly a Greek artist would not disown. It is difficult to carry farther the study of nature applied to a being, that does not exist.

About 1240 an actual flowering was produced in ornamental sculpture, as in statuary. Thus the friezes, capitals, bands, and rosettes, instead of being composed according to a monumental principle, were soon merely architectural forms on which the sculptor seems to attach leaves or flowers.

The example that we give in Fig. 65 is taken from the north portal of the cathedral of Troyes, and is the last limit of the combination of regular compositions with the application of the actual flora to the datails. Here the leaves are found in the flora of the fields, but the arrangement of the ornament belongs to the artist. A li tle later, the leaves will s simply be taken in the country with their stems, and will be applied to the surface of the band or capital. In the same c cathedral the capitals of the piers around the choir still p

present the regularity of architectural composition, with the addition of foliage taken from nature. The crockets themselves, simple buds before that epoch (1230), seem to expand; their s stems and fleshy and veined and are accompanied by leaves.(Fig. 66). A little later, as at the S. Chapelle of Paris (1240-1245), most of the capitals only present bunches of leaves, that appear attached to the bells, thus replacing the decorative members that we designate by the word crocket.

In presence of that rapid course of the art of sculpture, and particularly the perfection of the execution that develops more and more, one does not know what he should prefer, either the decoration still subject to monumental composition, or t that skilful flexible and ingenious imitation of nature, sought by the artists of the middle of the 13 th century. Yet in our opinion nothing is above the broad and clear, skilfully composed and already impressed by the observation of the flora, which is seen in the nave of the cathedral of Paris. The scale of the sculpture is in perfect accordance with that of the mo mouldings and the entire architecture. It seems that art cannot go beyond that. But it has even the essence of the sculpture of the middle ages not to be able to fix itself. Starting from the observation of nature in the flora as well as in the statuary, it must go forward, follow the best, and pursuing t this, attain the real. Taking nature as the starting point, from the interpretation one always by an irresistible tendency arrives at imitation; then when imitation wearies, one desires to do better than the model, he exaggerates and falls into affectation, mannerism and often into the ugly. Yet let us say that this robust school of Isle-de-France knows how to keep itself within the limits of taste, and that it does not cease to be retained, sober and distinguished to the last limits of the art of the middle ages, even when the other provinces, like Picardy, Burgundy and Champagne, fall into mannerism and ugliness.

Those schools are too carelessly confused in their decline. The buffoon figures with mannerism to excess of the art of t the 15 th century in Flanders, lower Burgundy and Picardy, prevent seeing our truly French works of the same epoch, works that taste did not cease to direct. Thus from that French school came in the 16 th century Jean Goujon, Germain Pilon, and

that pleiad of sculptors, whose works rival those of the best times.

Dating from 1250 the art is formed; it can rise no higher in the path that it has followed. It then combines an elevated style, sobriety of means, harmony of composition, excellent execution and an addition of naturalism, that still leaves a wide field to the ideal. Yet however seductive may be the beautiful works of sculpture from the second half of the 13 th until the 15 th centuries, it is impossible not to cast a look of regret behind, no tw return to that art filled with sap that extends, that speaks so much to the imagination by presenting unknown perfections. Every product of art that transports the mind beyond the limit imposed by the material execution, that leaves a memory nearer perfection than the work itself is the most excellent work. The memory that one retains of c certain Greek statues is for the mind a purer enjoyment than the sight of the object; and who has not sometimes experienced a sort of disenchantment in finding the reality! Does this m mean that those works are below the estimation formed of them? Not at all; but then have developed in the mind an entire series of perfections, of which they were really the first cause. That this psycologic phenomenon may be produced, two conditions are essential:- the first is that the work of art has been brought forth under the domination of an idea in the artist; the second is that he that sees it has a mind open to art matters. To form the artist, there is need of an appreciative public, accessible by the language of art; to form t the public requires an intelligible art in harmony with the ideas of the times. Since the 17 th century, we indeed desire that men think to maintain art at an elevated level, but have scarcely thought of finding this public without the intelligent sympathy, without which art falls into manufacture, no l longer expresses a feeling,,an idea or an intellectual need.

I is evident that during the middle ages there existed a close bond between the artist and the public. The middle ages did not make such a great number of sculpture to please a group, and art was a nearly democratic as it could be. From the capital of a province it penetrated to the last hamlet.

It had its place in the castle and on the humble house of the petty citizen; and this does not mean that the work was

splendid in the cathedral and the castle, barbarous in the vi village church o on the house of the citizen. No; the execution was more or less perfect, but the work was always a work of art, i.e., impressed by true feeling, an idea. The language was more or less pure, but the thought was never lacking, and it was understood by all. Then were found nowhere on the soil of France those monstrou and ridiculous works, which abound on our public or private edifices built within two hundred years and far from the great centres. The language of the arts has become a dead language over four-fifths of the territory, not because the people have rejected it, but because this language longer pretends only to be addressed to the elect. Then has occurred what happens to every exhibition of human thought, that restricts instead of extending the field of its development, it is not even understood by the small number of people for whom it is pretended to be reserved.

One of the glories of our lay schools of the 13 th century has been to make art common. The same among the Greeks, art w was in all,,in thepalace as well as in the utensils of the house, in the fortress as in the most ordinary arms; art was a need of life, and art exists only on that condition. [1] From the day when a people was taught to do without it, that it longer existed only for a caste, it was not by decrees that it could be made common anew. Men no longer decreed the taste, that could only be developed by pretended encouragement; for to encourage taste is to encourage a taste; to encourage a t taste is to kill art. Art is a tree that no one prunes and that has no need of props. It only grows in the free earth, taking its sap as it can and where it wishes, developing its branches according to its own nature. The feudal system had neither academies, councils of civil buildings, nor committees protecting the arts; it gave neither rewards nor medals; it was not anxious to learn whether in its domains drawing was taught, whether men modeled clay and carved wood; it had neither museums nor special schools, yet art lived and flourished everywhere. When the unique despotism of Louis XIV was substituted for the feudal system, when the government of the great king pretended to rule art like all other things, to form a criterion of taste, art put itself in order, adapted itself to the system, and was soon only in a dying condition, when

life is retained with great difficulty by drugs and stimulants, without being able to restore youth and health for a single day.

Note 1.p.249. They had not been invented industrial art, a term that demonstrates how much we have lost the true sense of art.

The productive power of art in the 13 th century, and partially of sculpture, is prodigious. After the wars of the 15 th century, the religious struggles, the demolitions due to the 17 th and 18 th centuries, the devastations at the end of the last (18 th) century, abandonment and neglect, the black bands, there remain to us in France more examples of the statuary of the middle ages, than are found in Italy, Germany, England and Spain, altogether. 1

Note 1.p.250. We remark here, that in our museums of Paris or of the provinces, in our schools, there is not a single c cast of that statuary to serve for instruction; and yet we are the exclusive people!

At the beginning of the 12 th century, the good statuary is of incomparable value, but it is also necessary to seek it. The great schools are formed and their branches extend very f far. After the middle of the 13 th century, remarkable works abound; a world of artists is constituted, the schools tend to settle into unity of method, and poor churches, houses and castles of pretty appearance sometimes contain works of sculpture of excellent execution and irreproachable style. Those artists are then scattered everywhere, and sculpture seems to be an art of the first necessity. At this moment of the development of the art of sculpture, the execution attains a high degree of perfection. Let one examine the statuary and sculpture of the ornament of the S. Chapelle of Paris, of the south transept portal of the abbey church of S. Denis, the lower pa parts of the right portal of the cathedral of Auxerre, the north and south portals of Notre Dame of Paris, the sculptures of the portals of Rheims and Amiens, and he can form an idea of the development, that art took under the reign of Louis IX. Never was the observation of nature pushed too far. In the m midst of so many works, it is difficult to select an example.

Still we present here one of the statues of the western p portal of S. Etienne of Auxerre. 2 (Fig. 67). This is a Bathsheba seated beside David. The head and the hands have been

broken. The body under the draperies has never been better re rendered. Never has been better expressed a simple and easy attitude. There is neither stiffness, organ pipe folds, nor physical poverty. This woman poses marvellously. Now all the statues of that portal have the same value, and notably the sibyls. It is clear that these statuaries did not seek their draperies on antique statues, and that they did not drape mannekins with wet cloths. This is the fabric on the living body; not a fabric with folds stiffened or weakened by a long stay in the studio, but the vestment worn, allowing to be seen all the movements of the supple body. There is not the costume worn by the ladies in 1250, but an ideal vestment, which has all the grace and ease of the ordinary clothing.

Note 2.p.250. Right doorway, whose lower part dates from 1250 to 1260.

We assert that the clothing of the 13 th century was no more favorable for statuary than our own, but artists rarely reproduce the garments of their time, except accidentally. They dr drape their figures according to their taste and their fancy, and men never knew better how to give to draperies movement, life and ease, unless in the best Grecian antiquity.

And even when these artists reproduced garments worn in their time, with what art did they arrange them, and give them nobility and style without departing from truth! And that until the end of the 15 th century. [1] This statue (Fig. 63) is o placed on the tomb of bishop Pierre de Roquefort in the old cathedral of Carcassonne, and represents a canon and is less than life size. [2] No school of statuary has known how to treat so well a vestment, that after all when analyzed has nothing very picturesque nor very noble. The manner in which the amess is arranged on the head, around the neck and before the chest, how the mantle is raised by the right arm, reveals a consummate artist. We will state that this statue is cut in hard sandstone, difficult to work. But no material was an obstacle for those image-makers, carrying care in modeling to the last limits. Certain marble statues of the tombs of the abbey church of S. Denis dating from the 14 th century, are finished with a delicacy in chiseling, flexibility in the material in which are treated the accessories, superior to that obtained by our best artists.

Note 1.p.252. It is understood that in speaking of the 15 th century, we occupy ourselves only with the true French school, leaving aside the Flemish grotesques, by which our art is habitually judged.

Note 2.p.252. This tomb dates from about 1320.

The middle ages are not contented to sculpture hard stones, marble and wood, it erected a great number of monuments of cast bronze and hammered copper. Nearly all those art works were cast into the crucible during the 18 th century and in 1793. There remain of them today but a very small number.[3] However the few suffice to show that the artists of the 12 th, 13 th, 14 th and 15 th centuries had carried very far the art of the founder. The two tombs of the cathedral of Amiens are masterpieces of art; one of them is in art a work of the first order.[4] Both represent bishops of natural size and in the r round, reclining on a plate of copper decorated by accessories. The whole is cast in one piece and admirably so. The crosses alone were attached pieces.

Note 3.p.252. A great number of bronze monuments were destroyed at about the end of the reign of Louis XIV. It was at that epoch that all the metal tombs and decorations of the choir of Notre Dame of Paris were cast, so as to aid in the arrangement of the new choir.

Note 4.p.252. See Art. Tombeau, in which we present some of these monuments.

There existed at S. Denis a tomb of Charles the Bold, dating from the end of the 12 th century, in cast and enameled bronze. The church of S. Yved of Braisne could show a great number of those monuments of enameled and gilded bronze.[1] We do not know how those artists of the middle ages managed to enamel bronze statues of life size; that appears impossible to us today. T That art was perhaps preserved till the epoch of the Renaissance for the statue of Charles VIII kneeling on his tomb at S. denis was clad in a royal mantle entirely enameled blue on b bronze with scattered fleurs-de-lis of gold.[1] The 12 th century had made a great number of bronze objects serving for t the decoration of edifices. Suger speaks of bronze grilles that he caused to be cast for the altar of the martyrs. There is still preserved in the museum of Rheims a magnificent fragment of a great bronze candelabra, that was placed in the sanctuary

of the church of S. Remy, and which dates from the middle of the 12 th century; one cannot see a cleaner casting and ornamentation more appropriate to the material. [2] Finally, there exist a great number of busts of copper or wrought silver of the 12,th, 13 th and 14 th centuries, serving as reliquaries, that are of excellent work; our sanctuaries possessed altars, canopies of cast and wrought bronze, enameled .nd gilded with great richness of work.

Note 1.p.253. See Monogrophbe de S. Yued de Broisne, by M. Stanislas Prioux.

Note 1.p.254. The collection Gangneres of Oxford, Bodelian Library, possesses a colored drawing of that tomb.

Note 2.p.254. For objects of bronze intended for interior decoration, see the Dictionnaire du mobilier.

Those bronze objects were habitually cast in large pieces and with a wax model. It was indeed necessary that this work should not go beyond ordinary procedures, for there existed in France a great number of tomb or other statues in bronze until the relvlution of the last (18 th) century. Collection Gaigneres of Oxford reproduces many of them, and the inventories of churches mention them on all sides. It is evident that most of these works in metal, large or small, were cast with wax models, for besides that the monk Theophilus mentions the use of that process, the existing monuments indicate that the casting was without seams, since no traces of them are found,and the texture op the casting is uniform throughout. If chiseling occurred, this is only to give life to the embroideries, to o obtain delicate lines, but nowhere are seen traces of the file, rasp or schaper. Besides, it is very well known that these im image-makers of the middle ages had the habit of making those wax figures of t e natural size, since frequent mention is made of them. Now those figures were made of dried earth, according to the procedure indicated by Theophilus. The procedure for casting is the same. Those bronzes of the middle ages are cast very thin, like most antique bronzes, and as are all the beautiful French statues of the Renaissance, among which may be c cited those of Henry II and of Catherine de Medici of the church of S. Denis. In those two statues the casting has not been retouched and remains as it left the mould. Now those figures were cast at one time and present no seams. The use of the l

lost wax process alone permitted obtaining such a result.

But the middle ages does not follow routine in the use of procedures. It continually seeks, simplifies, modifies and improves with such activity, that a monument or even an object is commenced according to one system and completed according to another. Not content with casting or hammering into shape bronze statues or large articles of furniture, such as pulpits, baptismal fonts, crosses for cross-roads, lecterns, well-curbs, tombs, candelabras, etc., it had adopted a mixed procedure, that allowed it to obtain singular results. Men cast a figure, like a mannekin clad in an undergarment, then on this bronze mannekin were successively placed outer garments, hammered, arms, jewelry of chiseled bronze, crowns and all ornaments composing a rich attire. Thus were fabricated some of the statues that ornament the tomb of Maximilian at Innsbruck; and although that monument only dates from the 16 th century, we find a method of fabrication adopted very early, not only in Germany, but also in France.

At other times the mannekin was of wood and was covered by very thin sheets of bronze shaped by the hammer or simply lapped, i.e., shaped on a wooden mould. Thus these artists of the middle ages could satisfy all the requirements of art and those of economy.

The age of Louis XIV, that pretended to have invented or reinvented everything, admits that before the brothers Keller none knew how to cast great pieces in France. [1] Without desiring to diminish in anything the merit of those artisans, we cannot admit that they reinvented the procedure of casting; they only caused the adoption for all casting, of a method rarely employed; and that is explained even by the nature of the art objects required from them. It concerned the casting of statues from the antique. It is evident that the lost wax procedure could not then be employed; they were then content to make a model of clay that was cast in plaster; on this plaster it was then to tamp pieces on the cast or original to make a nucleus, reassemble with great care the pieces around the nucleus, and to run the metal into the space left free. However interesting and precious this procedure may be, it had one inconvenience, it caused the statuaries to lose the habit of making lost wax casts, But it is very difficult if

not impossible, to tamp these pieces on an entire statue and to reassemble them exactly, the statues are divided in several parts, each being cast separately; then the parts are assembled by tenons, pins and rivets. Now by this process the b bronze never retains that entirety and unity of appearance of objects cast at one time. Since as the seams and pads reserved for assemblage are multiplied, it is necessary to pass over all the file and graver, and to strengthen the weak parts; h hence the cast statue only imperfectly reproduces the model of the master. We do not see that art gained much by that, unless to allow the first modeler at hand to have a bronze cast by a founder.

Note 1.p.255. It is the same for this singular claim as for many others at the same time. For example, it is repeated everywhere, that the wheelbarrow was invented under Louis XIV; now there are twenty manuscripts of the 13 th and 14 th centuries, whose vignettes present barrows much larger than those of the 17 th century. It seems that the bucket was invented by Pascal; the invention does him no great honor, but it does not belong to him. Buckets are seen represented from the 14 th century.

But when it was necessary for the artist, who desired to ha have a statue cast in bronze, to make himself the earth nucleus of his figure, -- for that nucleus is the essential part,-- to see that this nucleus made of clay and chopped straw should be well dried; when later it was necessary to cover that great model with a layer of wax, whose thickness must be accurately fixed; to model that wax to obtain the fine details of the fo form, then finally after having arranged the vents and gates, to cover all that by a thick layer of earth prepared expressly, to enclose and band it well, to heat the whole so that the wax escapes by melting, and finally after having combined the mixture of his metals and having built a furnace, to run the melted metal into the void occupied by the wax; then certainly there was in all a painful and uncertain labor, a series of calculations and combinations, an idea fixed from the beginning of the work and pursued to the end without hesitation. Th That the genius of our statuaries should not devote itself to that hard necessity, we desire indeed; but on the whole, art has lost, for the casts of the middle ages, as well as those

of antiquity and of the Renaissance, are superior in purity and lightness to those leaving our studios today. In Italy, Germany and France, during the middle ages were made admirable casts, and those sculptor-founders (for it was necessary to be both), French, German and Italian, did not believe that they were doing an extraordinary thing, when they succeeded in casting a great piece. They did not think it necessary to make their works valued by occupying an entire city, writing a memoir of a hundred pages, as Benvenuto Cellini did later in regard to his Perseus. They were wrong, and the example of that master poser, to use a recent expression that fits the man so well, proves that the noise in such a case, if it be no benefit to art, contributes to the fame of the artist.

Men never ceased to cast bronze objects in Gaul, and already from the time of Cesar our ancestors were skilful in working metals. The frequent relations with the Orient after the 11 th century brought improvements into that industry so ancient in France, and one should not be surprised to find castings of the 12 th century, which surpass in beauty all that has since been done. Such is the admirable candelabra of that epoch, that formed a part of the Soltykoff collection, and which was purchased for England. That object was cast at one time without an attached piece, and presents a series of scrolls and little entangled figures, the whole perforated, with admirable purity of execution and style. It came from the cathedral of Mans.

Until the middle of the 13 th century, if the statuary escapes in France absolute naturalism, the different schools do not all advance with equal steps; some maintain till quite late a sort of archaism, while that of Isle-de-France throws itself boldly into the increasing study of nature. There are even certain edifices in which probably were employed old sculptors, who had a statuary style relatively backward, or impressed with a style no longer accepted at the time of their construction. Thus the cathedral of Laon, whose facade cannot be earlier than 1200, even in the construction of its lower parts, exhibits on its doorways reliefs or statues, that have retained a very pronounced archaic character. The artist authors of those works were permeated by examples from Greek paintings. In the arrangement of the figures and in the compositions

is a seeking for symmetry, that recalls the vignettes of Greek manuscripts. That influence shows itself even in the choice of subjects, in the draperies, in some accessories such as seats, canopies, etc. At Notre Dame,of Rheims, the north transept d doorway, now masked, is all all impressed by the style of Greek paintings, although that doorway is by some years later than the year 1200. Nothing similar at Paris; the statuary s seeks the study of nature after 1200, and does not desire to concern himself with Romanesque or Byzantine traditions. One fact indicates how much the new school reacted against those traditions. On making excavations before the central portal of Notre Dame of Paris, there was found a certain quantity of f fragments of a central relief representing Christ in glory on the day of judgment, like the one seen today; but that sculpture is impressed by the archaic style of the 12 th century; besides the stone of it is entirely fresh without any change produced by time. That relief was suppressed shortly after h having been finished, to be replaced by the existing subject, due to the artists of the new school. And indeed when one c considers that sculpture composed of five figures, Christ, t two angels, the Virgin and S. John, one notes notable differences in the execution of those colossal statues. Christ and one angle that holds the nails, already belong to the school leaning toward naturalism, while the Virgin, S. John and the angel bearing the cross are still archaic sculptures; yet it was materially impossible to introduce the two first statues in the midst of the three others. They must have been set togeth

Of all the provinces, Champagne advances very rapidly in the new path; and the statuary of the portal of Notre Dame of Rheims is the proof of this. Naturalism has already strongly permeated this statuary, which dates from about 1240. Still with regard to that portal, it is necessary to indicate the indecisions, that have not been found in the school of Isle-de-France. Some colossal figures, notably those at the right doorway representing the visitation, are inspired in the composition and execution of the draperies by Roman statuary, numerous remains of which existed elsewhere at Rheims. One does n not find in that portal that unity of style, which with the e exception just mentioned at Notre Dame of Paris, is striking in the statuary of Isle-de-France. Another school, that of

Burgundy, so beautiful already at the beginning of the 12 th century, retains its freedom of charm during the 13 th century, whether it concerns the statuary or the ornamental sculpture. The power, energy, bold and living execution, are the characteristics of that school. It is unnecessary to require of it a at the momen of the emancipation of the lay school the refinement, restraint and distinction, that compose the qualities of the school of Isle-de-France. It seeks grand effects and o obtains them. Burgundian sculpture perhaps particapates more than any other in the architecture; one can render account of that quality in seeing the compositions of the gables of the church of Vezelay and that of S. Pere. [1] In all the monuments of this province, that sculpture is at a lerge scale relative to the architecture, and sometimes determines the arrangement of the latter instead of being subject to it. It is further cut with an energy and enthusiasm, that place this school in the first rank in monumental art.

Note 1.p.Art. Pignon, Figs. 8, 9.

We give (Fig. 69) a head of one of the censer-bearing angels of colossal dimensions, which decorate the top of the western gable of the church of Vezelay. [2] The character of those features nowise recalls the statuary of Isle-de-France. There is something bold in the face tha contrasts with the calmness of the heads of the Paris school. This other head of the Virgin from the same portal (Fig. 70), [3] presents a particular t type, that we find again, neither in the statuary of Paris, nor in that of Rheims, Amiens or Chartres. The arrangement of the hair, the disorder of the covering of the head, the realism sought in the features, and even modeled broadly by strongly accented planes, mark the style of Burgundian statuary about the middle of the 13 th century. At the same time we give (Fig. 71) one of the capitals of the same facade and of the same epoch. The qualities of the statuary also occur in that plan ornament, broadly modeled, and that seems to assume life under the chisel of the artist. To properly seize the differences of these schools; even in the full 13 th century, let us see the sculpture of the hall of the synod of Sens, built about 1240, almost at the same time as the western gable of Vezelay. Sens is i Champagne, but the hall of the synod was built by an architect from Paris, with materials from Paris, and wo

which appeaps probable, by the aid of a subsidy from the king S. Louis. 4. Now here is one of tne groups of the external capitals of the great windows (Fig. 72). Certainly naturalism in sculpture can scarcely be pushed farther; what a difference of style between this sculpture and that of the capital of Vezelay, when starting from a common principle, one can obtain different art characteristics! Life and movement also exist in that sculpture of Sens, with more elegance and delicacy, with a more exact care for nature and a more flexible execution. If we enter the S. Chapelle of the palace at Paris, we shall find even more refinement in the execution and more grace in the mode of interpetring nature.

Note 2.p.258. These statues measure 7.05 ft.(Art. Pignon, Fig. 9).

Note 3.pp258. This figure is placed at the right of Christ.

Note 4.p.258. Art. Salle, Figs. 1 and 2.

We can say too frequently, that those brilliant epochs of art, because they have attained splendor in seeking the better, could not stop. From style, broad and simple conceptions, inspiration obtained by the first thoughtful observation of nature, tney reached material imitation, labored imitation, then mannerism and its exagerrations. When the artist observes nature, he takes at first the principal characteristics. He is no longer scientific; he sees seductive forms, he is inspired by them rather than copies tnem servilely. This is the beautiful moment of the art, very full of promise, allowing even more to be divined than it explains. But nature has powerful attractions for whoever observes it. Soon the artist recognizes that his inspirations and deductions, his almost so, are very far from the reality; he loses his model, and he daily finds new aspects and charming qualities, that had escaped him. Then t tne translation becomes increasingly literal. From creator ((at second hand) he becomes copyist; he is subjugated by the divinity, that inspired him till he knows it better, and only longer thinks of showing it as he sees it, That is the hour of naturalism, an hour that sounded for Greece and for our sc schools of the 13 th century.

But in this naturalism of sculpture, does art enter for nothing? May be; composition, the arrangement of those charming models gathered in the fields, count for something, and in t

that our artists are still masters, naturalism being accepted.

As for statuary, it manifests a need of formulas: it is true that the hieratic and traditional mode is no longer accepted, but the necessity is felt when art penetrates everywhere and requires a great number of hands, for establishing practical methods that permit avoiding gross errors. it is well understood that the masterpieces, or rather those with sufficient genius to produce them, occupy themselves little with those rules. But precisely in basing on these works of the masters, that are formulated rules for the generality of artists. In the Album of Villard of Honnecourt, that dates from the middle of the 13 th century, is seen to appear the use of those m mechanical procedures suited to facilitate the composition of figures, and even of ornaments. There is every reason to believe that these methods, otherwise very ancient since one finds their application to the arts of design of Egypt, were never lost, and were transmitted to the West by the school of Alexandria, by the Greek painters of Byzantium. Their appearance in the collection of sketches of Villard of Honnecourt is no less a fact of great interest, because it seems to indicate a free application of formulas, that had a hieratic character until the beginning of the 13 th century.

We have stated how the image-makers of the middle ages had learned to observe and render the pose in compositions and fi figures. However rude the work, the pose is never false. Now the sketches of Villard give us the key to the formular adopted to attain that result. According to these sketches, geometry is the generator of the movements of the human body and of animals; it serves to establish certain relative proportions of figures; he says so himself and he gives some examples taken in passing. [1] From the time of Villard, then the image-makers possessed these practical methods, and if they could not inspire the artist of genius, could prevent him from falling into gross errors. One of those designs with the pen, that we reproduce here (Fig. 73), indicates these practical procedures. Comparing this mode of drawing with the figures and vignettes of manuscripts, with drawings on stained glass, and e even with statues and reliefs, ue are brought to recognize, during the 13 th and 14 th centuries, the general use of these geometrical means suited to give the figures not only their

proportions, but correctness of movement and pose, without ab abandoning the monumental requirement, that made those digures accord so well with the firmness of the architectural lines; and an interesting fact, the results obtained by these procedures recall the designs of the most ancient Greek vases. A sort of canon is rudely represented by Villard and seems to be adopted. [1] Correcting it in proportions by the aid of the best statues, notably those placed in the interior of the western facade of the cathedral of Rheims, we obtain Fig. 74. T The line A B, the total height of the human figure, is divided in 7 parts. The upper part is occupied by the head and neck above the shoulders. Let C D be the axis of the figure, and t the line a b equals 2/9 the height A B. The point E being at the middle of the line C D, through the point E are drawn two lines a f, b e; from the point g are drawn two other lines g e, g f; the line b h gives the length of the upper arm; the height of the knee is on the line i k. The length of the foot equals 5/9 of one part. The measures of the canon being established, let us see how the image-makers proceeded to give movement to their figures, when these movements were not absolutely presented in profile.

Note 1.p.263. "Here commences the method of drawing to design the figure as taught by the aid of geometry to work easily." (See Album of Villard de Honnecourt, published in fac-simile by J. B. Lassus and Darcel. Plates 34, 35, 36, 37).

Note 1.p.265. See Plate 36 of the Album.

First example (75):- it is necessary to represent the figure on one leg. The line b c (of the canon, Fig. 74) is vertical, hence the geometrical axis of the figure is inclined from o to p (Fig. 75). The movement of the shoulders and of the body follows that inflexion. The axis of the head and of the heel of the right leg are found on the vertical. A figure must ascend (second example), the axis of the figure is vertical, and the heel of the right leg is raised and is found on the inclined line s t, while the line of the neck is on the lene l m; in that movement the body remains vertical. The third example, while retaining the same geometrical sketch, shows how a figure can be subjected to a violent movement. The person has fallen; he supports himself on a knee and an arm; with the other arm he parries a blow struck at him; the head is brought on

the vertical. Besides the general figure generates that movement, like the two former ones.

That the last movement be more, we obtain Fig. 76. Now keeping the left thigh on the line a f, we are forced to bring the heel to c, to find the length of the left leg (the ground being horizontal), which is perfectly in movement. In the last example the line e f is horizontal. It is clear that in adopting these practical methods, all members of the figures must be developed in elevation without foreshortening. But in monumental sculpture and in reliefs destined to be placed far f from the eye, vivacity of pose and clearness can be obtained only on condition of adopting the elevation. It is this in g great paintings and in stained glass. At the beginning of the beautiful epoch, the Greeks proceeded in the same manner, and the personages of the metopes of the Parthenon, of the friezes of the temple of Theseus, are drawn on this principle.

Examine the drawings that decorate Greek vases and we shall see that the artists of antiquity certainly employed methods analogous to those that we present here. Villard of Honnecourt draws the figures wit movements entirely in profile, that are obtained by geometrical procedures; among others a thresher in the barn, whose attitude is perfectly correct; a horseman charging in a very true movement; wrestlers, women with one knee on the ground, etc. We repeat that those methods can only prevent errors; they were no restraint for genius, that knew well either to free itself or to invent new ways. This was a means of retaining the monumental style in the composition of sculptures, and of obtaining clearness in execution, two qualities tolerably neglected since the 16 th century.

Did the statuaries of the middle ages execute from models t the innumerable figures that decorate their buildings? We do no think so. As they certainly did not have time, and then the haste of execution and certain irregularities, tha are observed in their statuary, exclude the existence of the clay model. Perhaps they made rough models at a small scale? But we are led to believe, that they traced the general lines of their statues on panels, one for the front view and the other for the profile view, and that by the aid of these two views, they roughed the stone while seeking the details from nature itself. One sees in many statues of the 13 th century, besides

a fart of the figure treated with love is a bit much neglected, that does not occur when artists work from models; then this work is uniform and often softened by the translation into s stone of a model made of clay or wax.

The monuments prove to us that the Egyptian sculptors, when they made sunken modeled reliefs, commenced by simply drawing the figures on the surface, that they sunk the outlines and sought the modeling in the solid stone; and still this modeling attained marvellous delicacy. Although we know that the Greek artists, especially after Phidias, made models in wax or in soft materials, it is not proved that the sculptors preceding Phidias proceeded thus, when they had to make statues of wood, stone or marble; the elevation always observed in t the Eginetan statuary, on the contrary causes the supposition that these primitive artists were satisfied by a drawing before proceeding to the final execution.

Already about the end of the 13 th century, men commenced to feel in France the sovereign influence of that divinity c called fashion, a divinity as cruel for the past as it is indulgent for the present time. Then it was seen that all artists at the same time adopted in statuary not only the clothing of the day, but certain physical charcateristics, that a are regarded as approaching perfection. One cannot deny that the empire of fashion is such, that it influences the figure up to a certain point. The features and bearing, even the forms of the body are arranged as from a common mould, accepted as being of supreme elegance. That was not born yesterday; t the Greeks themselves sacrificed to that changing goddess.

The statuaries of the middle ages habitually forbade the r reproduction of the nude. Their figures were draped with rare exceptions; now the charm of a nude and of a draped figure is not the same, and we only see too much since the beginning of the (19 th) century, to what sad results to our sculptors have attained by conceiving a clothed figure as a nude, or rather by seeking to clothe Apollo or an antique Antinous; nothing is more awkward. In the bearing of a nude person accustomed to move without clothing, there is a grace foreign to that belonging to a clothed person. The ancients knew that, and thus t they have given to their clothed personages different movements and poses than to those, which they knew so well how to

give their nude figures. Not observing these laws, men frequently give us statues that have the air of porters clad in a general way, or at least appear very uneasy in their borrowed c clothing, and not the eternal cloak that drapes the marshal of France, as well as the learned man or poet, can disguise this defect in fitness.

Our sculptors of the middle ages then resolutely adopted their system of making clothed figures; they gave them the m movements and pose familiar to men accustomed to wear such clothing. Thus the clothes of their statues have the air of f fitting the body, and do not appear to be borrowed from the costumer. The numerous statues of the tombs deposited at S. Denis and from the 13 th and 14 th centuries, among which we cite those of Louis and of Philip, son and brother of S. Louis, those of Philip the Bold, of the count of Evreux, Charles V and of Jeanne de Bourbon, from the portal of the Celestins; t the statues of the internal tympanum of the western facade of the cathedral of Rheims, those of the portal of the library at the cathedral of Rouen, though already impressed by the a affected manner, that causes the grand style of the 13 th century to be regretted, are works superior in character, beauty of arrangement and execution. In the statuary around the choir of the cathedral of Paris are also found a number of very good figures, less than nature, that date from the commencement of the 14 th century. The calamities that afflicted the kingdom of France during the entire middle of that century scarcely a allowed it to occupy itself with art, and yet the schools did not allow their instruction to be lost, since we see them resume new splendor toward the end of the reign of Charles V. That prince was really a lover of the arts, encouraging them by choice rather than quantity, and caused the erection of v very important structures, whose sculpture was very good, so far as can be judged by what remains to us. Under the reign of that prince was erected at the north side of the north tower of the cathedral of Amiens a great buttress, very ornamental and very heavy, intended to stop the movement of vibration produced in that tower when the great bells were rung. On the face of that buttress are set seven colossal religious and h historical statues, of excellent work. Those statues represent:- the holy Virgin, S. John Baptist, Charles V; the dauphin, later

Charles VI; Louis of Orleans; cardinal de la Grange, bishop of Amiens, superintendent of the finances, and Bureau de la Riviere, chamberlain of the king. [1] On examining these statues of the end of the 14 th century, like all those of that e epoch, it is easy to see that the artist forst of all held, (since he clothed his figures), that the clothes should be properly worn. Now to properly wear a long vestment, for example, it is necessary to give the body certain bends, that would be ridiculous for a person entirely nude. It is necessary to emphasize the hips, to keep the legs apart, and by the movements of the body to cause the drapery to adhere to certain parts and to float free at the others. To make a good mannekin for the clothing of a clothed statue is not an easy matter. Our statuaries of the 14 th century had that merit at le least. Thus the statue of cardinal de la Grange, that we just mentioned, is perfectly understood in the movement of the nude to make the vestments appear well. Yet this movement would be shocking for a nude person. We give a sketch (Fig. 77). The right leg supports more than the left one; the latter stays t the body, which bends backward to make the right thigh project. The left houlder is depressed, contrary to the rules of balance for a person that did not have to occupy himself with t the pose of a vestment. Here (Fig. 78) is a copy of that statue of cardinal de la Grange, that sufficiently shows that the movement indicated here was given in view of obtaining this beautiful projection of the draperies at the right side. According to the fashion of the time, the person is stayed by the left leg by projecting that leg, raising the knee a little, and resting only on the inside of the heel. The pose, arrangement and style of the draperies, the character of the head, a are by a distinguished artist. Besides the interest that it presents, the statue of Bureau de la Riviere is a work of statuary no less remarkable. Those statues are 8.2 ft. in height.

Note 1.p.269. See Notice by M. Goze, correspondent of the committee of arts and monuments, on these remarkable statues.

Charles V left in hes family an enlightened taste for the arts, and dating from that reign we see the princes of the blood royal place themselves at the head of a new art movement, that neither historians nor archaeologists of our time appear to h have taken into account sufficiently. Indeed Louis of Orleans,

second son of Charles V, assassinated in the night of Nov. 23 to 24 by the duke of Burgundy, was a prince loving the arts with the passion of an old connoisseur. During the insanity of his brother Charles VII until the day of his death, i.e., from 1392 to 1407, he governed the affairs of the kingdom almost alone, with the queen, Isabelle of Bavaria. It was during that period that Louis of Orleans purchased Coucy and executed immense works there, that he built Pierrefonds, Ferte-Milon and Vees; that he repaired the castles of Mont-Epilloy and of Crespy, all important fortresses, intended to make of Valois a territory proof against attack. It is to be believed that the finances of the kingdom largely entered into these acquisitions and these works; but what is alone important to us here is the particular taste presiding over all these great structures. From the point of view of architecture, they are broadly conceived and treated, nowise partaking of the meagreness and labored effort, with which may be reproached the style of that epoch. Besides, all are impressed with the same style, and seem to have been erected under the direction of a single master of works. The mouldings are of exceptional beauty for the time, and the sculpture has a breadth and distinction, surprising in the midst of the tricks of the end of the 14 th century. The statuary still remaining at Pierrefonds a and at the castle of Ferte-milon has all the amplitude of our better Renaissance, and if the clothing of the personages did not belong to 1400, one could believe that this statuary dates from the reign of Francis I. Yet one finds very little at that epoch, which has that breadth of style and that monumental execution. Fragments of the statuary of the castle of Pierrefonds, king Charlemagne, king Artus, [1] archangel S. Michel of the east tower, the Virgin of the great relief of the facade, are the works of consummate masters in the practice of their art, and are entirely full of beautiful feeling. Perhaps never has such well clothed statuary caused one to feel the nude w without affectation, by giving to the vestments their actual appearance, easy and without a labored imitation of details. Tomb statues of the beginning of the 15 th century have a breadth of style from which the Renaissance too frequently wanders. It suffices for us to cite the statue of Isabelle of Bavaria at S. Denis; that of a bishop in gray alabaster in the

museum of Toulouse; those of the princes of the house of Bourbon in the abbey church of Souvigny; numerous fragments deposited in the museums of Dijon, Rouen, Orleans and Bourges.

Note 1.p.271. Two of the nine knights that give their names to the towers of the castle. Those statues are 7.5 ft. high. Those knights wear the war costumes of the end of the 14 th century, rendered with remarkable flexibility.

It is clear that this French art from 1390 to 1410 was far from the meagreness and poverty with which it is reproached by those, who seek examples of the last Gothic statuary in Belgium or on the banks of the Rhine. The ornament of Pierrefonds is in accord with that good statuary; it is ample and m monumental, admirably composed and with sober and excellent execution. The statues of the knights that decorate the existing towers of the castle of Ferte-milon present the same qualities. It is a complete art, no longer the art of the 13 th ce tury nor the dacadence of that art, falling into labored work, but which possesses its own character. It is an actual renaissance, but a French renaissance without Italian influence. The Valoir, those princes of Orleans, Louis and Charles, and finally he that became Louis XII, had ordinarly taken the head of the arts in France and made themselves enlightened protectors, and under their patronage were erected edifices, that anticipated in a truer direction the movement of the 16 th century. Witness the old city hall of Orleans, now a museum, built in 1442, and which one would assign a much more recent date. [1] That edofice, whose facade is due to master Viart, presents a charming and original ornamentation, that no longer has anything of the Gothic ornamentation, but which is better understood, and particularly is a broader composition than that adopted under Francis I, when the arts of Italy exerted an influence on our artists. To return from it to the castle of Pierrefonds, that seems to us to be the starting p point of a reform unfortunately interrupted by the wars and later by the introduction of the Italian element, its ornamentation assumes a particular character. One no longer finds t there sculptures at a scale that takes no account of the architecture. On the contrary, the scale of that ornamentation is in perfect accord with the purpose of the place, clear and e easily seized, inspired by the flora without subjecting itself

to absolute imitation. The beautiful scrolls of foliage, for example, that surround the great niches of the knights, placed at 82.0 ft. from the ground, and that are destined to be seen very far away, have all the breadth suited to the place. Their accented modeling produces a very rich effect without confusion, so common a defect in the ornamentation of the 16 th century. Thus from the beginning of the 15 th century, beside the old Gothic school that was dying, there was a group of artists preparing a renaissance in all branches of architecture. In spite of the misfortunes of the times, that school maintained itself, and the practice of art, far from sinking, attained at the middle of the 15 th century a high degree of perfection. The ornamentation of parts of the S. Chapelle that date from Charles VII, as well as those of the edifices of the time of Louis XI, are sometimes broad and well composed, preferable in that respect to the sculpture of the end of the 14 th century, which sins by meagreness and the defect of scale; that ornamentation is always executed with surprising skill. To s see those things without prejudice, indeed it was this French school of the 15 th century that formed our artists of the Renaissance, rather than the relations with Italy, as we explain elsewhere. [2]

Note 1.p.272. See Architecture domestique of MM. Verdier & Cattois. p. 60.

Note 2.p.272. See Art. Architecture.

The lay schools that from the end of the 12 th century took possession of the culture of the arts started from a good principle; solidarity of the works concurring in the monumental whole, and thoughtful study of nature. If these schools at c certain times suffer the influences of fashion, those variations do not deviate from this constant study. They drew from their own ground, not from the imitation of arts foreign to t their spirit. They made themselves neither Greek, Roman, Byzantine nor German; they followed their own path, and their time understood them. There was a force, the force that had sustained Greek art. However prejudiced one may be against the sculpture of the middle ages, he cannot mistake its originality; that quality suffices to give it a high rank in the history of the arts. In truth, all art that lacks originality, that lives only by borrowings, even if these were made from the

best sources, it could not hope to retain a place in the course of centuries; it is soon effaced and goes to fill those limbos, where dwell in oblivion all the works that have possessed but an artificial life.

The middle ages have very frequently colored statuary and sculptured ornamentation. This is again a point of affinity between these arts and those of Grecian antiquity. The statuary of the 12 th century is painted in a conventional manner. One finds on the figures of the doorway of the abbey church of Vezelay that we have described to our readers, a tone generally yellowish white; all the details, the features, folds of the garments and their borders, are outlined by very fine black lines, very skilfully drawn to accen the form. The same procedure is employed at Autun and Moissac. Behind the figures the grounds are painted reddish brown or yellow ochre, sometimes with a slight scattering of white ornaments. This method cannot fail to produce a grand effect. In the first half of t the 12 th century, one rarely finds statues colored in different tones. As for the ornaments, they were always painted in light tones, white, yellow, red, light green, on dark grounds. About 1240 the coloring took possession of the statuary, whether that statuary was placed outside or inside. The two statues of Notre Dame of Corbeil, mentioned at the beginning of this Article, were painted in light and varied tones, the jewels enhanced by gold. The statues of the western portal of Chartres were painted in the same manner. Sometimes even gofferings of lime paste were applied on the garments, as may still be seen on the portal of the cathedral of Angers. Those gofferings were painted and gilded and represented figured f fabrics or laces. The nude parts of the statuary at that epoch are colored very little, nearly white and outlined by brownish red lines.

It is unnecessary to state that the statuary of funerary m monuments was painted with care, and that on those works of art one can still examine today the means of coloring employed. We saw the statues of the Plantagenets at Fontevrault entirely covered by their old painting before the transfer of those f figures to the museum of Versailles.

The 13 th century only continued this tradition. The statuary and ornamentation of the portals of Notre Dame of Paris,

of the cathedrals of Senlis, Amiens, Rheims, and the lateral porches of Chartres, were painted and gilded. And like the sc sculpture, the coloring tended to naturalism. Yet this painting did not entirely consist of flat tones laid on the garments and the nude parts; art intervened. In the sunken folds, in the parts opposed to the light, or that might have too brilliant reflections, one recognizes the application of dark glazes. Vigorous outlines in black or bronze give relief to the modeling and life to the nudes. Thus on the grounds of t the folds of light blue robes the painter has placed a russet glaze; at other times he has accented pure yellow tones in t the light by cold glazes obtained with black. Artists that made the admirable stained glass of the 12 th and 13 th centuries, had a too perfect knowledge of the harmony of colors not to apply this knowledge to the coloring of sculpture. And in truth, that is not so easy as one might believe at first. The experiments of this kind made in our time prove that the difficulty in such a case is great, when one desires to preserve to the sculpture its gravity and modeling, and when he claims to obtain something more than dressed dolls. Harmony of tones enters for much into that painting of objects in relief, and this harmony is not the same as that adopted for f flat paintings. Thus for example, in flat paintings the artists of the middle ages rarely placed beside each other two t tones of different colors, but of the same value. That is a resource that they employed with parsimony. On the contrary, on sculpture after the 13 th century, those artists sought tones of similar values, trusting to the modeling in relief to prevent them from annoying the eyes. Indeed, the natural shadows neutralize the discord resulting from the juxtaposition of two tones of equal value, and those equal values give the reliefs a unity, a grandeur of appearance, that tones of very different values take from them. This study can be made on some colored monuments that still exist, as for example, the reredos of the chapel of S. Germer deposited at the museum of Cluny, the tombs of the abbey church of S. Denis, parts of the reliefs of Notre Dame of Chartres (western portal), of N Notre Dame of Rheims (north portal, now concealed). Particularly on the great external sculpture can one prove this system of coloring during the first half of the 13 th century. A statue

being covered by a robe and a mantle, the painter adopting b blue for the robe and purple for the mantle, has prepared his two tones so as to present to the eye the same values. Each color has a chromatic scale of tints; assuming for each color a scale of five tints, the artist will adopt for the same figure, for example, the no- 3 tints of blue and purple, but very rarely tints No. 2 and 3. Thus the coloring leaves to the sculpture its grandeur. Later on the contrary, about the end of the 13 th century, the painters sought contrasts. They placed on the same statue a rose tone and a dark blue tone, a whitish green or a dark purple. Thus after theat epoch painted sculpture loses the monumental gravity, that it had retained during the first half of the 13 th century. Men did not hesitate to recognize the defects of this striking coloring, vivid, brilliant and too real, for about the end of the 14 th century, while retaining tones of different values on the same statue, they covered those tones so well by ornaments of gold, browns and blacks, that this network disguised the contrasts of the colors and restored unity to the entirety of the figure. The coloring of statuary or of ornamental sculpture in the 15 th century is rarer on the exteriors of edifices. These paintings are reservef for tombs, reredoses, furniture and internal reliefs. Yet one finds at that epoch tones of external coloring; thus the statues just mentioned, that were discovered in the ruins of the castle of Pierrefonds, and that decorated the facades of the towers, were painted, but with only three tones; yellow, brownish red and white. Nearly all the sculpture of the mansion of Jacques Coeur at Bourges was painted; some traces of the tones employed are still distinguished.

During the Renaissance still remained some traces of those traditions, unfortunately lost definitely after the 17 th century.

It must be recognized, that painting applied to sculpture gives it a singular value, but on condition that this application be made with intelligence and by artists, who have acquired experience of the effects of color on objects in relief, as we said above, effects not those produced on flat surfaces. For example, very dark tones assume brilliancy on reliefs. A black tone placed on the clothing of a statue, by the effect of light will detach itself in light on a brownish red ground

of a niche. This sort of painting thus demands a special study, a series of observations of nature itself, if one desires to obtain satisfactory results. But to declare that painting applied on sculpture destroys the effect of the latter, that it is the consequence of a depravation of taste, because some whitewashers have placed red or blue by chance on statues, and that this is ridiculous, or to judge the question rather hastily, since the Greeks in all times painted sculpture as they painted architecture; yet they cannot be regarded as barbarians. In spite of abuses, the art of the period of the middle ages toward its decline still manifested a great vital force. Sculpture at that epoch is not to be scorned so much a men wish to say; it has a feeling for effect, an experience acquired in a long time, which gives it great importance; besides it attains a perfect certainty in execution. From that school came our best Renaissance artists.

To conclude, one should not demand from the art of sculpture of the middle ages models to imitate, any more than one should require them from the arts of Greece. Wha should be sought there are the principles on which those arts are based, the truths that they have found, the manner of rendering the ideas and feelings of their times. Let us do as they have done, not what they did. In that it is the same as with poetry' this is always novel and young, because it resides in the heart of man; but all poetical arraratus grows old, even that of Virgil, or that of Horace.

Sunrise is always a moving and novel spetacle; and if our first parents could say that the celestial cavaliers, the Acwins, preceded the chariot of Savitri with the golden hand; Homer, that Aurora with rosy fingers opened the gates of the Orient; the troubadours, that the sun rose from the waves of the plain; ought we not to say:- "In their revolution, our plains and our mountains present themselves anew to the rays of the sun." In causing to fall from their supernatural sphere all the poetic myths of the Vedas, of antique Hellas, have we not perceived behind those personifications of the forces of nature horizons extending very differently, the scientific epic of the formation of the universe offers to the mind of man a broad field, without its being necessary to cause the intervention of the Titans of the reign of Saturn? Let us be true;

preserved by the work of Dom Planchet, and lacks neither grandeur nor originality. It had reminiscences of antique monuments, and very certainly of the Holy Sepulchre of Jerusalem. T The two enormous cylinders containing the stairs ascending to the upper galleries, externally lightened by niches, were evidentln a memory of some Roman construction. In the time of D. Planchet, i.e., in 1739, this edifice of the first years of the 11 th century was still intact; only the tops of the two stair towers had been rebuilt in the 12 th century, then repaired at a more recent epoch. In our Fig. those roofs are restored.

The analogy between this edifice and the Holy Sepulchre of Jerusalem cannot be doubtful. The central opening of the side aisles up to those two little apses of the second story placed at each side of the extreme chapel, mark the desire to imitate the monument of the Holy city, to which traveled numerous pilgrims during the entire course of the 11 th century. But this monument is not the only one in France, built with the intention to imitate the Holy Sepulchre.

There exists in the department of Indre (Arrondissement of Chatre) a church that has retained the name of its original type, the church of Neuvy S. Sepulchre. This edifice was founded "in 1045 by Geoffrey, viscount of Bourges, en the possessions of a lord Eudes of Deols, who had made a pilgrimage to the Holy land. The chronicles that mention this foundation state that the church was built in imitation of the Holy Sepulchre of Jerusalem:- "Founded in the form of S. Sepulchre of Jerusalem." [1]

Note 1.p.283. See the Note on the church of Neuvy S. Sepulchre in the Archives des monuments historiques.

The church of Neuvy S. Sepulchre is of circular form with side aisle and upper story. Here (Fig. 6) is the ground story. The construction of this rotunda is further very rude, awkwardly joins the older church, modified and almost entirely rebuilt about 1170. In the walls a,b,of the side aisles of the nave a are found traces of the arches of that primitive church, at the end of which Godfrey caused the erection of the copy of the Holy Sepulchre. The entrance of the edifice is at A. One ascends to the gallery of the second story by the screw stairs B. That gallery leaves a space at the centre of the rotunda,

and dates from an epoch after the first crusades (about 1120). It is difficult to know how the founder of the rotunda of Neuvy intended to terminate his monument, and it must even be re recognized that the architect, who erected the second story later, did not know to cover that circular structure. The side aisle of the ground story is vaulted and the outer wall is v very thick, not only in the height of this ground story but a also in the second story. On the contrary, the cylindrical wall resting on the columns of the second story is thin. This structure recalls that of the rotunda of S. Benigne. Everything leads one to believe that the architect of the church of Neuvy S. Sepulchre had the intention to maintain this central cylinder by ceans of an annular half tunnel vault resting on the great external circular wall. The section of this edifice made on the line c d (Fig. 7) will explain this arrangement. The dotted lines indicate the primitive project, such as it seems to us to have been conceived. At A is the half tunnel vault, whose construction was motived by the thickness of the outer wall A; at B is the truncated cone built in carpentry or even in masonry on the internal cylinder, according to the arrangement adopted for covering the Holy Sepulchre of Jerusalem. In this case a central opening to the sky was reserved at e. However that may be, this project was never finished, either by lack of resources, or by the difficulty of erecting a cone or vault on the thin dome pierced by windows, that surmounts the columns of the gallery of the second story.

The church of Neuvy S. Sepulchre was in great veneration d during the 11 th, 12 th and 13 th centuries, for in 1257, the cardinal Eudes de Chateauroux, bishop of Tusculum,"sent from Viterbo to the chapter of Neuvy a fragment of the tomb of Jesus Christ and some drops of his blood."These relics were placed at the centre of the rotunda, in a sort of grotto in imitation of the tomb of the Saviour at Jerusalem. That grotto existed still in 1806, the epoch when a priest of Neuvy destroyed it because it masked the altar at the end of the nave.

The section (Fig. 7) gives a complete idea of this curious monument. On examining it, it is easy to recognize that the construction of the 11 th century stops at the level D. All the arches of the lower story are round, while those of the upper story are pointed.

At E on the exterior is an arcade of quite delicate work, a and the entire construction is much better treated above the level n. Corbels set at F were perhaps intended to receive t the carpentry centres suitable for constructing the half tunnel vault A, or for placing tiebeams of a carpentry covering, assuming that the project of the upper vaults of the gallery was abandoned in the 12 th century. Some years since a a shapeless roof covered this rotunda and threatened ruin. Desiring to preserve this precious monument, the commission of historical monuments decided that a flat carpentry roof covered by lead should be placed on the gallery, and that a vault of terra cotta, likewise covered by lead, should crown the internal cylinder as indicated in our Fig.

The grotto that had been placed at the centre of the rotunda was not the sole example of that reminiscence of the Holy Sepulchre that existed in the West. One also sees today in t the chapter hall of the cloister dependant on the cathedral of Constance a little structure once placed in the cathedral itself, and which was intended to recall the Holy Sepulchre placed at the centre of the rotunda of Jerusalem. That structure of circular form is decorated by open arches with little columns. Around the exterior are placed against the piers statues of half life size and good work, representing the annunciation, the birth of Christ, the adoration of the shepherds and the Magi; above are the 12 apostles. Inside (for one can enter that rotunda, which is 6.6 ft. diameter) are other statues representing an angel, the three holy women coming to visit the tomb of Christ, holding scent-bokes in their hands; two groups of sleeping soldiers, and one man habited like a doctor, having before him a table on which are placed vessels; he stirs something in one of them. Near that person is a woman that shows a finger to two other women holding closed vessels. This curious monument is in the Italian style and dates from the 13 th century.

The rotundas just described are not the only ones built in France from the 11 th to the 12 th centuries, in imitation of that of the Holy Sepulchre. Here must also be cited the rotunda of Lanleff, in which men have long desired to see a pagan temple. This monument is partly destroyed and consists of the circle of internal piers to the number of 12. These piers have

a parallellogram is section, and are each flanked by four engaged columns supporting archivolts and transverse arches. A circular wall with three apses, [1] as at the Holy Sepulchre, surrounds these 12 piers and receives the imposts of the cross vaults covering the side aisle on 12 engaged columns. Other intermediate columns of smaller dimensions divide the circular wall into bays, each pierced by a very small by a very small window. The doorway opens to the northwest, while the central apse is orientated to the east. This edifice of the rudest work appears to date in the 11 th century.

Note 1.p.287. Only one of these apses still remains.

At Rieux-Minervois near C.rcassonne is a circular monument with a circular monument with a circle of internal columns a and little apses, whose construction dates back to the end of the 11 th century; it is also entirely an imitation of the H Holy Sepulchre of Jerusalem. The circular edifices known as chapels of the Templars, such as those that exist at some points in France, Metz and notably at Laon, are reminismences of the Holy Sepulchre. But the order of Templars was especially devoted to the defense and preservation of the holy places, and erected in each commandery a chapel, that must be the representation of the rotunda of Jerusalem. The temple at Paris had its circular chapel.

SERRURERIE. Ironwork. Locksmith's Work. Fixtures.

The Romans were experts in the art of ironwork, if we judge by some fragments that have remained to us. They employed iron in structures, not as we use it today, but for clasps, cramps, pins, dowels, keyed bolts, dovetails, angles, straps, etc. In Gaul in the Roman epoch, certain frovinces were celebrated f for their products in wrought iron, notably the provinces of the north and east, Berry and Dauphiny. Like all great industries, that of the fabrication of works in iron must suffer from invasions during the 5 th and 6 th centuries, although most of the new conquerors were no strangers to working metals; but the newcomers rarely employed these materials except for utensils, arms and wagons. As for the art of construction, it had fallen so low, that men scarcely thought of using iron o otherwise than for rudely ironing doors and making gratings. Monastic establishments took in hand this lost industry; they

undertook to work abandoned mines, to establish furnaces and forges, and soon they could attain relative perfection, or at least place in circulation a considerable quantity of iron a articles wrought with the hammer. Gradually the art of the locksmith resumed great importance, and for it certain peoples of Gaul had a peculiar aptitude, and from the beginning of the 12 th century the industry of forged iron was carried very far. Yet the means of fabrication were weak; men had neither rolls, sheet rolls, nor wire-drawing machines, they were ignorant of the power of the steam motor, that permits the working of iron in large pieces. A trifhammer moved by a stream formed the e entire equipment of a mill. Iron was obtained in forged ingots of moderate weight, then given to the smiths, who by strength of arms converted these ingots into bars, wrought iron, and rods more or less small. Then the file had not been invented, chisels did not exist or could have very little force. That penury of means was one condition that the fabrication with the hammer reached a certain perfection. Those smiths of the middle ages had further acquired great skill, when it was necessary to make welds, which we only make with difficulty today. It is true that the first procedures for reducing iron into bars were so numerous, that they gave the metal a quality not attained by our methods. Our iron passes from the state of cast and scarcely puddled ingots to that of bars by rolling between cylinders and without intermediate processes, while formerly iron only passed gradually and by repeated puddling, from the state of ingot to that of bar or sheet. That iron was hammered constantly and acquired a tenacity and at the s same time a flexibility, that it cannot have by the means employed today; more dense by hammering, more compact and ductile, less mixed with particles of cast iron, it did not burn so easily in the fire, and welded more easily at a red heat and without becoming brittle. But these qualities of iron puddled by hand being recognized, it is no less necessary to mention the rare skill with which the smiths of the middle ages knew how to weld complicated pieces without burning them, which required placing in the fire a great number of times. Besides, they used wood charcoal, both for obtaining cast iron a and for converting pigs into ingots and hammered iron; wood charcoal leaves to iron qualities of flexibility and ductility,

that are partly removed by coal. It is with the fabrication of iron applied to art works as for many others; what is gained on the side of industry, rapidity, power and economy of means, is lost on the side of art. In perfecteng the mechanical procedures, man gradually neglects that tool superior to all others, termed the hand. Still one experiences insurmountable difficulties, when it is necessary to fashion great forged pieces with the arms, and the great ironwork of buildings was only born at the time when the powers of mechanics could be seriously employed. Thus there were placed in edifices, either for ties or armatures only pieces of wrought iron, whose greatest weight did not exceed 441 lbs., whose greatest length did not exceed 13.1 ft., and yet pieces of that size are very rare before the 13 th century. We have shown how the ties were combined during the 12 th, 13 th, 14 th and 15 th centuries (Art. Chainage) in great structures. They consisted of a series of champs hooked together or set in the stone. For iron f framework, it is well understood that there could be no question; and even in wood carpentry, iron was not employed (Art. Charpente). Yet from the 13 th century iron filled a very important part in structures as ties, cramps, armatures of openings, but always in small pieces. Connections, swellings of champs, cross-pieces, eyes and their pins often repeated, form in masonry sockets for large irons, that by oxidizing burst the stone and caused serious thoubles. They indeed tried to p prevent the danger of oxidation by setting it in lead, but t this means was insufficient, and a good number of monuments partly owe their ruinous state to those masses of iron set be between their courses and fixed in their beds. By insufficiency of mechanical means, great ironwork remained in a barbarous condition, while small ironwork on the contrary rose to the height of art, very perfect in its form and means of execution. In the same edifice whose great ironwork exhibits the simplest procedures of fabrication, as at Notre Dame of Paris, you find hinges of doors, whose marvellous execution is a subject of a astonishment for men of the trade. For those smiths of the 12 th and 13 th centuries, iron seemed to be a soft materoal easy to weld, like wax or lead, and it is with great difficulty t that some very rare workmen of our days succeed in fashioning pieces of that nature, which were then very common.

In the regulations of Etienne Boileau, there is no question of a guild of locksmiths fabricating the great ironwork of a building, bu only of "greifers," makers of fixtures for doors (hinges) and "grossiers" (makers of tools), and of locksmiths (makers of locks). Those workmen could take as many apprentices as they pleased and had permission to work at night, excepting locksmiths, because of the accuracy that this sort of work required.

Hinges were a kind of ironwork much esteemed during the middle ages, and which required a special apprenticeship. We shall first occupy ourselves with that part of the fine ironwork of buildings.

PENTURES. Hinges.

This designates the iron bands nailed and bolted to the leaves of doors, fitted with eyes restiug on hinge-pins, designed to sustain these leaves, and to permit them to swing easily on those pins.

Jousse, [1] in his treatise on ironwork, so precious today b because it retraces in part the procedures employed by the wo workmen of the middle ages, thus expresses himself in regard to hinges:- "These are flat bars of flat iron, that it is necessary to pierce along their entire length, to attach them to the door with nails riveted inside, or indeed with a cramp p passing through the neck of the band, this cramp passing through the door and riveted on the wood at the other side. The end of the said band is bent around the size of the pin of t the hinge-pin, which is the end that projects from the stone or wood, in which it is set; which end of the hiuge-pin enters the eye of the said band, that may be welded if one wishes and rounded so that the pin turns easily inside. Others make Flemish bands to carry the said doors. Those bands are made of two bars of iron welded together at the end and bent like the former to pass and turn on the hinge-pin. After welding, they are opened and separated from each other as much ar the thickness of the door, then bent as squarely as possible to join t them together and hold the two sides of the door, chiefly at the cost of the outside; that shape of bands is better than the common kind, because they hold the two sides of the door. Three are ordinarily put on; sometimes two of these Flemish bands or other straight ones, with a pin at bottom, that fits

beneath the door, and that is still better, provided it be w well made and set ar it ought." Indeed the hinges of doors during the middle ages were made exactly as Jousse indicates even to the commencement of the 17 th century. Those pieces of iron have considerable importance from the point of view of the art of the smith. The workman that can forge a hinge like those that we find so frequently attached to the doors of edifices of the 1M th and 13 th centuries, attained the last limits of his art and can fashion the most difficult pieces.

Note 1.p.290. De la fidelle ouverture de l'art de Serrurerie, by Mathurin Jousse. 1627.

Fig. 1 shows various kinds of hinges. At A is the simple hinge with its eye at b, its neck at c, the staple attached behind the swelling of the neck at d. B is the plan of the hi hinge in the section of the door; d' is the staple with its double clinching at e; at f is the fastening of the hinge-pin. The line o p s indicates the rebate of the jamb. Frequently the edge of the leaf is sunk to reach the bottom of the rebate, and the eye of the hinge is bent as seen at m, detail C. Then the eye has less depth than the flat of the hinge, to not weaken the wood too much, according to the perspective sketch G. A washer e is interposed between the square shank h of the h hinge-pin and that eye. Flemish hinges with double bands are made according to the sketches I and K. The oldest hinges have welded to their necks an iron arc that strongly holds the leaf near the edge. (See at L). This system was adopted from the 11 th century, presents a difficulty in welding, for it is necessary to draw out the iron to form the two stubs of the branches, so as to weld them, then leave the end sufficient to roll up the eye, weld it and curve the end. (See at O). These operations require care to not burn the iron, and that the welds of the two curved branches be broadly made, the iron having just the proper degree of heat. But these difficulties are n nothing, compared to those resulting from the welding of numerous branches that frequently compose these hinges, and that spring from the principal stem. It is unnecessary to believe that the multiple branches welded to the bands of the hinges are mere ornaments. Those branches are pierced by holes to permit multiplying the nails, strongly holding the planks between them and forming on the leaf a sort of network of iron, prev-

preventing the bands from bending, i.e., deflecting under the weight of the planks. The smiths find in theat requirement of construction a motive of ornamentation. Indeed, the oldest h hinges are composed in such fashion, that in suspending the leaves on the hinge-pins, they hold over quite a large space the planks nearest the neck or the eye. Thus one finds quite frequently hinges at the end of the 11 th century, that take the form of a C (Fig. 2), welded to the neck, so that the two branches A nailed on the planks strongly support them from B to C. Soon a band independent of the hinge and termed a false hinge, holds all the planks of the leaf solidly together. Hinges of this kind are seen on one of the doors of the cathedral of Puy-en-Velay and at Ebreuil. The last are very beautiful and we give a drawing of them (Fig. 3); they date from the beginning of the 12 th century. The neck of the hinge in form of a C passes through the wood and is welded, as indicated by the detail A. At B is the section of a branch at a b.

The general composition of the ironwork of the church of E Ebreuil is quite remarkable. Each leaf is suspended by only two hinges, seven false hinges decorate the planks and hold t them together. The middle false hinge is richer than the six others and forms a double palmatium of beautiful character. This ironwork is set on skins cemented on the wood and painted a vivid red. Two rings attached to bronze lions' heads facilitate the closing of the leaves.

The art of welding with the hammer had already attained great perfection at the commencement of the 12 th century. Examples abound and we have only the embarrassment of selection. When it only concerns the welding of secondary branches to a principal stem, the need is not very difficult for a skilful smith; but if one undertakes to unite scrolls to a centre, to form a sort of interlacings, the work demands great experience and a hand as active as skilful. Those false hinges, for example, from the door of the church of Neuvy S. Sepulchre (Fig. 4) present a forged work of real difficulty. To obtain the welds A and B, especially at A, if the workman be not very adroit, he greatly risks burning his iron, for he must place the piece in the fire several times, and that at a single point. He commences by forging and welding a piece C, to which he welds the eight branches one after the other; now the bra-

branch a being welded, if he wishes to weld b, he knows that his fire and blast must be directed only on the end b, without heating the piece a red. For the welds B, the two branches E and G being forged, they are both heated at g, then hammered to weld them together on a back piece h. (See that decorated back piece h, prepared before the welding). We shall see with what skill the smiths at the end of the 12 th century came to fashion pieces even more complex. The ends of the branches are scrolled as shown by the sketch H, so as to leave an eye for passing the shank of the nail p with square head.

But this sort of hinges were already very rich in ornamentation and required a great number of welds, for all these scrolls must be forged separately and welded to the principal b branches. A simpler procedure was often employed, yet which permitted a sufficiently fine ornamentation. This procedure consisted in detaching certain parts of a heated band and then giving them special curves. Thus (Fig. 5) let there be a flat iron band A; along its sides are cut while hot little iron tongues a, this hot band of iron is curved edgewise as indicated by sketch B; then each of the tongues is curved in volutes a'. The eye of each scroll was intended for passing the stem of a nail c, whose head pressed down the top of the iron (see b). The curved branch was then welded at D to the straight band of the hinge.

This example comes from a door of the church of Blazincourt, and dates from the 12 th century. The ends E of the curved b branches end in the form of heads as indicated by the profile F. To obtain that result the iron was upset, then split and formed with the hammer before curving the branch and its volute

Here at G is another hinge forged on the same principle and taken from the church of S. Saturnin of Moulins. [1] One sees at g how the smith has split and prepared the straight band of the hinge to obtain the little volutes h. Nothing was simpler than this kind of work, which required no welds except those of the two curved branches of the straight stem. Those scrolls were naturally the places of the nails, and avoided holes in the bands or branches, a great number of holes weakening the iron and often causing breaks. The doors of the church of S. Martin at Angers still have false hinges, that are a remarkable work of forging and welding. Fig. 6 gives one of those fa-

false hinges. It is not very easy to weld the middle circle to the four branches of the cross. Those bands were hammered hot on each other, then cut out with punch and chisel. At A is a section made on a b, and at B is the detail of one of the end leaves C. When it is necessary to weld two pieces of iron laid on each other, the bottom piece is heated a cherry red and the top piece to white red, then hammered with light strokes at f first, heavier strokes as the iron cools. Id the two pieces w were both heated to a white red, one would risk finding nothing on the anvil at the first blow o the hammer. By the different degrees of heating the smiths could succeed in welding a great number of pieces together, as we shall soon see.

Note 1.p.295. These drawings of full size were furnished to us by M. Darond Jr., architect at Bordeaux.

The false hinges of S. Martin at Angers date from the 12 th century and present for that epoch the singular peculiarity of openings arranged in the bands and cut out after the welding of the pieces. The hammering of the two superposed irons, the circle and the two branches of the cross produced the form D after the operation, -- this form D being the junction E,-- for the double thickness of the iron was drawn under the hammer to fill the angles. The angles were trimmed with the graver without the aid of the file, which was not employed at that epoch. Yet it was more rational to give more thickness or width to the welded parts, and to profit thus by the procedure to contribute more to the ornamentation. In that spirit were fabricated the pretty hinges of the 12 th century attached to the south doorway of the old cathedral of Schlechstadt, of which we give the drawing in Fig. 7. The neck A is welded to the two branches C by means of a reinforcement, as seen in the profile at B. The stem itself has a reinforcement D under which is w welded the end G of the principal, this end being flattened to facilitate welding. The reinforcement D was welded on the end F of the straight band, also thinned. So the iron drawn out laterally by hammering while hot has been utilized in the ornamentation. At H is sketched at larger scale the head of the bolt passing through the reinforcement of the neck; that bolt head has two stamped washers. At I is sketched the section of the band made on a b. One will note the strokes of the graver on the welds forming engraved lines. Those cuts of the graver

being made at the time the iron was cooling and only a dark red, also strengthened the weld and concealed the irregularities produced by hammering on a plane surface. Strokes of the graver are also seen at g, the ends of the longitudinal welds of the branches.

The examples just given show that simple forged hinges, i.e., composed of a single thickness of iron, wrought more or less. But the smiths, when they fashioned hinges of great dimensions were compelled to give the principal band very great thickness near the neck, which made the welding of the branches difficult and the hinges very heavy; or to reinforce these bands by others as ribs, which without much increasing their weight, added greatly to their strength. These bars or ribs were welded to the principal bar only at certain distances by cross-pieces, so that the superposed bands retained great elasticity and extraordinary stiffness.

Indeed, if on an iron band 3/8 in. thick (Fig. 8) we weld another bar only by means of two cross-pieces A and B, leaving the two bars free between them, as shown by the section C, we obtain a stem, stiffer and less subject to fracture than if both bands were welded together for their entire length. Even (Fig. 9) we form the principal band of several stems placed b beside each other and welded only at the cross-pieces, we shall also obtain a great resistance and have less to fear from fractures. Then assuming the principal band D to be formed of three stems E, F, G (See section H) welded at the pieces I, K, this band will have as much stiffness as a solid bar, but will be less subject to fracture and will be lighter.

The smiths adopted these methods from the end of the 13 th century, and we have a very remarkable example of them in the fabrication of the hinges of the two lateral doors of the western facade of Notre Dame of Paris, which date from the same epoch. These hinges are largely forged of bundles of stems, b both for the bands of the branches, bundles sometimes welded together for their entire length, sometimes only at certain points, but always solidly connected by means of rich cross-pieces, reinforced by appendages that add to the solidity of the work as well as to its ornamentation.

Useless to repeat here the singular opinions expressed and relating to the fabrication of these hinges, during the last

(18 th) century and still in our days. Some have claimed that they were cast, others that they were pretty wrought with the file, several that they were composed of sprays of cast iron welded together by an unknown process. We say at once that t the locksmiths never disdained the mode of fabrication of these hinges; but in questions of that nature, men often prefer to write entire pages in a study to consulting the first artisan found.

However, Reaumur has indicated the actual method employed to forge the hinges of Notre Dame of Paris. "Whatever may be said of it," he writes in the note inserted in the Encyclopedia, "the body of the hinge and the ornaments are of formed iron, and are made as one would make them today, sometimes welded to the ends of the others; what is best there is not even the fashion they have been so, the palces where pieces have been attached are quite visible if examined with care; n not sufficient care has been taken to smooth them, though this was easy to do." Indeed the welds are seen at many points and were not smoothed by the graver or file, yet were as skilfully made; but did Reaumur perhaps desire to speak of certain pieces applied in the 15 th century to repair damages, and simply m nailed beside the old fragments? "However that may be," he adds, "those hinges are certainly a work that demanded a very considerable time, and were difficult to execute. It is not easy to conceive how one could weld together all the pieces composing them; yet it appears that all those of one hinge have been , before then applied to the door, for he would have burned the wood n heating the two pieces to be joined." (It must be confessed that this last observation does not lack simplicity). "One could not place such a mass of iron in an ordinary forge; it seemed necessary in such a case that the forge should be brought to the work. They apparently employed portable bellows, such as are used today in serious cases; they took care to weld the bands, ties, flowers, etc., in all places where the little stems and slender branches joined a larger stem or branch.

Applied pieces (welded on too) conceal the places where the others have been welded (end to end); that can be observed in several places where the bands or sprays have been removed; those bands and sprays have doubtless been removed and been repaired after having been welded." Although this appreciation

of the work before us may be sufficiently exact, yet Reaumur evidently had consulted a smith. The pieces that he indicates as applied are welded and were not punched after welding, but before; their cross-pieces have sometimes been retouched with the graver, but while hot.

Further, let us examine these hinges by laying aside those appreciations more or less approaching the truth; as we have caused to be made those absolutely similar,[1] we can speak of them with accurate knowledge of the means employed or to be used.

Note 1.p.301. By the skilful lockesmith, M. Boulonger.

Naturally, the first operation consists in drawing a cartoon of the hinge that one intends to have forged, at full size; a cartoon that serves as a pattern for forging and stamping a first all the sprays and stems developed; after which the sprays are welded together according to the drawing to form the branches; then those branches or groups of leaves to the stems, then the leaves are welded to the principal band, and then the stems are given the required curves. As much to conceal as to consolidate the welds, then are applied hot and consequently welded, flat on the first welds, other leaves or clips, rings, cross-pieces and ornaments.

We cannot give in this work the whole of the hinges of Notre Dame of Paris; besides these entireties have been fully published in the Statistique monumentale de Paris from very good drawings by M. Boeswilwald, and in part in the work of V. Gailhabaud. Not there is what i important for us, but indeed the details of fabrication. On this point we insist.

The bands of these hinges are not less than 6.3 to 6.7 ins. wide at the neck with a thickness of about 0.8 in., and as we have stated above, they are composed of several bands united and welded at certain distances by means of cross-pieces, which add great strength to the work, and that cover the welds of the curved branches. To facilitate the knowledge of the wo work of the forge, we proceed from the simple to the compound.

The cartoon being drawn, of which we give a fragment (Fig. 10), a cluster or termination of a scroll, the smith commences by forging each spray separately; for example, that at A as indicated by detail a; B as indicated by detail b; C as indicated by detail c, etc. He has taken care to leave at the

end of each spray a stub of iron, which allows him to head t these stubs reddish white and weld them by hammering. Then t the sparys being welded, he has obtained at the base of the group a flat surface, whose edges were trimmed with the chisel while still red. The stub of the branch was placed in the fire as well as the end D of the branch, then the bunch was welded to the branch. To conceal this hammered surface D G of the stem with leaf E was welded as seen at E'; then on th - is the cross-piece H carrying the leaves K was welded in its turn. When this piece was placed in the fire it was only a t thick block of iron; by means of the die the smith gave its r regular form and welded it. Then with a chisel he cleaned the edges of the scales from the branch. It must be stated that t the last pieces had been heated to reddish white, while the flat D G intended to receive them was only heated to red. Thus the underside thus offered sufficient consistency to not be deformed by hammering on the tail of the leaflet E, and by the violent blows given to the cross-piece by the sledge on the die.

But perhaps some of our readers do not understand what is meant by a die. It is a would of tempered steel in which has been cut a hollow of the form to be stamped. Thus all the leaves and buds of this group were obtained by means of dies. For example, the smith has formed with the hammer the spray b, at the end of which he has left a slightly flattened mass of iron. This mass was placed in the fire, then laid on the die having the form b, strongly strucg by one or more blows of the hammer, according to the relief to be obtained or the size of the ornament. The iron was thus moulded, and the edges of the ornament were easily worked. The skill of the smith consists in he heating the iron to the proper degree. If too hot, it spreads under the hammer, and that may strike and break the die; not hot enough, the iron is struck uselessly to obtain a good mould, and then the spray must be commenced anew, for the already flattened iron being treated again and hammered, cannot f fill the hollow of the mould and will only give an imperfect copy.

One will conceive that it is easier to shape and weld a group of this kind, than to join branches already loaded with groups and sprays of leaves welded on those branches. The forger of the hinges of Notre Dame of Paris commenced by fashion-

fashioning separately each spray entering into the general composition; then he welded those secondary branches thus loaded, if not bent to their final curves, to the principal branches, then these to the princapal band, which is the body of the hinge, as the trunk is the body of the tree. These last operations are far more difficult, because of the precision that they require to give these branches the froper length in welding them, by the weight of those pieces that must be handled quickly, and by the degree of heat required to be given to each part to be welded.

Here (Fig. 11) is another fragment of the hinges of the doorway of S. Anne,[1] which presents the junction of two secondary branches, A and B and the sprays a,b,c,d, to a principal branch C. As the branch D is the continuation of the principal branch C, these three branches A, B, D, were first welded together at E, with an extension E G finished with the chisel. On the flat of the weld E was first welded the group of leaves H, then the great branch C terminated by the cross-piece K and its leaflet, this leaflet having been stamped with the cross-piece K on the iron E beneath, heated to a red; the branch C itself was welded on the termination E G and stamped in ribs while hot, after the first hammering. On the body of the branches where the leaves are superposed, as shown by the details M, the weld of these leaves gives a projection, of which the smith disposes by stamping a rosette as seen at O, or in form of a cross-piece as seen at P. The difficulty is also to obtain at the junctions of these branches, curves that follow regularly without breaks. For that the workman has drawn his cartoon on a stone or slab of plaster, and after each weld he applies his hinge on the pattern to be certain that he retains exactly the curves and lengths, the distances of each part.

Note 1, p. 304. This doorway is that on the right on the western facade of Notre Dame of Paris.

If we now describe the procedures employed for shaping the band or the principal body of the hinge, we shall have rendered an account, so far as necessary, of the fabrication of the great hinges of Notre Dame of Paris. This last piece is the most difficult to forge, especially near the neck. The band is not made of one piece of iron, but of a great number of pieces welded side by side and end to end.

If we take one of these hinges, the lower one on the leaf of the door of S. Anne, that everyone can examine very closely, we shall see that this hinge is compbsed of five principal pi pieces (Fig. 12):-- 1, the neck A; 2, the first member B; 3, the second member C; 4, the third member D; 5, the branch E. Each of these members was arrembled separately with its princ-ipal branches, its secondary branches and its sprays. Further, the band or body of the hinge is composed of four bars for the neck; for the second member of the same; and for the fourth member of three bars also, but smaller. These bars are paral-lel and joined, but are only welded at their ends a,b,c,d,, etc These welds end in flats, slightly thined like a chisel at t their ends. When it is necessary to join these five bars into a single one, the ends g and h are prepared,heated and welded, the weld being then reinforced by a welded corss-piece. The ends e, d, are the same, and so up to the neck.

Let us analyze this last operation, the most difficult and troublesome of all, because of the considerable weight of the piece, the extent of the welding and its importance, since f from the perfection of the work results all the strength of the hinge.

Fig. 13 represents the welding of the neck A to the first member B. That weld having been made (see the profile P), the sprays C and D are welded on top; then the cross-piece E, wh-ich already bore before its application the five leaves F and its two stems G. The piece being welded on the face and edges, the moulding H was stamped and cleaned with the chisel,both on face and edges. At I is seen the section of the four bars composing the neck and welded together at K; at L is the sect-ion of three bars composing the band of the first member, and at M is the section of the branches previously welded to the end of the band.

We think it unnecessary to insist on the difficulties pres-ented by this work,not to burn the iron, and to give it exact-ly the degree of heat required for a good weld. It is evident that this triple operation of hammering hot, that those super-positions of sprays and cross-pieces give great resilience,to the iron and ensure the solidity of the first weld (that of the two pieces of the band), by reinforcing it and submitting it several times to the fire and to hammering. The ornamentat-

ornamentation is then here the result of the procedure of fabrication.

The beginning of the 13 th century is the climax of the art of the smith. The hinges of Notre Dame, the grilles of the a. abbeys of S. Denis, Braisne and Westminster; the hinges of t the cathedrals of Noyon, Sens, Rouen, etc., which date from that epoch, [1] show us examples of forging that cannot be surpassed nor even attained; for we cannot regard as forged works those of hammered and repoussee iron of the 15 th and 16 th centuries. There is an entirely different procedure of fabrication, and that is outside the domain of architecture. From the end of the 13 th century men sought to avoid the difficulties of welding, to replace iron stamped not by means demanding less work and time. The smith recoiled from the work that required robust arms, care, great experience and extraordinary skill of the hands. One still sees pretty hinges on the monuments of the 13 th century, that further do not differ in the method of fabrication from those just presented.

Note 1.p.307. Art. Grille. Also see Serrurerie du moyen age by M. Raymond. Bordeaux. Oxford. Parker. 1858.

At the beginning of the 14 th century the hinges take forms generally smaller and more divided; the bars are flat and no longer require toilsome labor.

Here (Fig. 14) is a hinge of that epoch from the north door of the old cathedral of Carcassonne. Its curvature is delicate and labored; the few welds are well made and have not been s strengthened and covered by the cross-pieces usually employed until the middle of the 13 th century. This hinge dates from about 1320.

Here again (Fig. 15) is a very simple hinge, well combined, that comes from the door of church S. Jaques of Rheims, and which dates from the middle of the 14 th century. The leaf has pivots P, and the hinges are indeed only doubled bars, that grip the cross-bars and planks as shown in section A. Externally the face of that false hinge is decorated only by a salient angle and very prettily forged nails. At C are sketched the face and edge of one of those principal nails. At D is g given the section of the hinge with edge only 0.3 in. and middle 0.3 in. thick.

For this sort of works of fine ironwork, men came from welded to hammered iron, cut wit the die or chisel, then

hammered cold or at a low temperature. The custom extended a after the 14 th century to fabricate plates, i.e., pieces of iron armor of hammered iron and repoussee, with this sort of work in vogue, and it entered into the fine ironwork of buildings.

For hinges at that epoch, they are more frequently made of one piece of hammered iron cut apart, than obtained by means of welds as before.

We present here (Fig. 16) an example of this sort of the w works of the 14 th century. [1] At A is represented the hinge, or rather the piece of hammered iron before cutting. This piece of iron then had the form given by the part a b c d e. Well hammered and flattened uniformly, trimmed along its edges by the chisel, on its outer face were traced the lines indicated on our drawing. then the piece i k l m was cut out and re removed. Placing the part A d in the fire, it was bent edgewise as shown by the finished side B; replacing in the fire the branch D, its parts were separated so as to form angular openings g. The three branches were cut out with the chisel and shaped with the hammer as shown by the leaflets h. The work thinned the iron in extending it, and the part can be finished without replacing in the fire. The ends of the leaflets a are slightly curved downward so as to rest on the wood and a avoid projections, which would tear the clothing of persons p passing beside the leaf. Same procedure for the branch E and the group F. Besides the nails, whose holes are marked in our Fig., a clip G held the neck of the hing against the stile of the leaf. At H is traced the profile of the hinge, and at I is the detail of the clip with its forked ends suitable for clinching inside the stile.

Note 1.p.309. Taken from the abbey of Poissy. This hinge in 1847 was still in the hands of an inhabitant of Poissy, forming a part of his collection.

In regard to this clip, we mention here certain hinges composed of a simple band and that are not nailed on the leaves, but are only held by means of clinched clips. At L is an example of this sort of hinges sometimes employed when doors only consisted of planks nailed on cross-bars. At M the profile of the hinge L shows the driven clips, and whose pointed ends a are to be clinched on the cross-bar P to hold it well. Then

these clips O have from p to s exactly the width of the cross-bar.

These modifications in the procedures of fabrication of those pieces of fine ironwork must lead gradually to the use of wrought iron applied afterwards on the principal body of the hinge. Yet Germany preceded us in that path of the use of wrought and repoussee iron as a decorative means for fine ironwork. Already about the end of the 14 th century are seen the works of German ironwork, notably at Augsburg, Nuremberg and Munich, wrought iron employed as ornaments, and what we should term today repoussee plate, while in France this mode scarcely appears to be adopted before the commencement of the 15 th ce century for works of any importance.

Fig. 17 will explain the use of this mixed procedure. [1] The band of the hinge is a simple bar of flat iron 3.5 ins. wide and at most 0.35 in. thick.

Note 1.p.311. From a fragment of a hinge (beginning of 14 th century) from a house at Gallardon.

On that band was applied an ornament of wrought iron cut o out and raised; then on the ornament was placed an iron rid stamped like a rope, with enlarged eyes to receive the nails, and the head of an animal at the end. The ornament of sheet iron is further pierced by holes to receive nails, either passing through the band or driven directly into the planks of t the leaf. At A is presented the section (doubled) of the band, with the movement of the ornament, the covering rod and the heads of the nails. At B is the profile of the end of the hinge with the animal's head terminating the round. This method allowed a very rich ornamentation at small cost, and without having recourse to welds. Yet sometimes these pieces of wrought iron of about 0.04 in. are welded on a rib while hot and without interposing any material more fusible than iron. It must be said that this sort of ironwork was rarely set directly on the wood, but on cloth or skin, or felt glued to the leaf. Besides it was the same for most hinges, and one still finds the traces of this cementing. The hinges of the church of Ebreuil, that we gave at the beginning of this Article, as already stated, are set on a skin carefully applied on the l leaf and painted red.

Here is an example (Fig. 18) that will make intelligible in

what consists this procedure of the application of sheets of wrought iron, cut out welded on a bar of wrought iron. Let A be a band of wrought iron. Two sheets a and b of wrought iron of about 0.08 in. thick are cut out according to the sketch B (half full size) and compose a recess in two planes; after t these sheets have been fixed by rivets, they are placed on t the band of wrought iron made red in the fire. At the same t time two iron bands c, c, heated to a white red, are fitted along the endges of the cut strips of iron, then struck by a die, that welds them and gives them a twisted or half round ornamentation. These two rods being welded to the iron band, then hold the perforated strips of iron. Holes are then punched at the centres of the openings to allow the hinge to be nailed on the leaf. Frequently ornaments d of repoussee iron like m washers contribute to the decoration of the heads of the nails.

At D is drawn the eye of the hinge, that being double and the pin also having an eye. A bolt passes through these eyes and forms a sort of hinge that replaces that system of hinge-pin indicated in the preceding examples.

During the 15 th century men did not absolutely renounce w welded and stamped iron in the fabrication of hinges, for th-ere still exist a good number of these works, that without a attaining the perfection and imfortance of those of the 12 th and 13 th centuries, furnish objects of ironwork much to be recommended.

If this hinge (Fig. 19) drawn at Thann is without these cr-oss-bars and ribs applied on the welds of the 13 th century; if it is obtained in great part by means of cutting out hot indicated in Fig. 16, its terminal florets are still welded to the stems, then stamped and chiseled after stamping.

Besides,its composition is graceful and well intended to h hold together on a great area the planks of the leaf. The ch-iseling and cutting in oronwork about the middle of the 15 th century assumed an importance the greater, as the hammering while hot was more neglected. Which tends to state that when the tools were perfected, the hand of the workman had lost i its skill.

The work of Mathurin Jousse however shows sufficiently, that still at the beginning of the 17 th century, the master smiths had preserved the traditions of the art of forging; and the i

information given by that author on the different kinds of i iron, on the mode of treating this metal in the fire and on the anvil, are a summary of very just observations and of an exact knowledge of the practice.

What merits fixing the attention, besides the form more or less good given to the works in iron of the middle ages, is the care with which all is foreseen so that these pieces may have just the arrangement suited to them. When the architect erects the jambs of a doorway, he foresees the places for setting the hinge-pins, and even if the doorway is of great dimensions, those hinge-pins are set between the courses in building; when he gives the drawing of the leaves, this still foresees accurately the positions of all the ironwork, which is never concealed. When the ironwork is ready to set, no cuts are to be made in the wood or stone, and each object takes t the place assigned to it from the beginning of the execution. Thus for example, for the internal doors that must shut accurately in the rebates, to that the projection of the hinge m may not prevent the direct shutting of the leaf against the jamb, the neck of the hinge is often bent.

(Fig. 20). In this case the last plank of the door A was a attached afterward and held to the other planks by dowels, and on the neck of the hinge by a last nail clinched outside, instead of being clinched inside like the others. This arrangement already existed from the 15 th century. Thus the leaf shut exactly into its rebate, without the need of notching the stone to receive the projection of the neck of the hinge.

It is not an insignificant detail, when it relates to harmonizing the different trades in that common work, that is called architecture. The beautiful epochs of the art are those in wh which the master of the work knows how to foresee from the o origin of the structure all the parts, and can assign their places without having to retouch what is done. If the last object to place in an edifice under construction at the given hour takes exactly the position it must occupy, the constructor is a master. He cannot give himself that name, if his work rises only by the aid of trials, of perpetual changes and alterations; if it be necessary for him to cut again here or to fill there, in order to set his final works, such as the joinery and the fine ironwork. All these trials are good on paper,

not on the monument.

In leaving visible all the fine ironwork, the masters of the middle ages were indeed forced to give it its true place like its actual form. Further, it was easy for them to recognize whether the work was well done. When we today sink angles, h henges, attachments of handles and bands into joinery, and all that i covered by three coats of paint, it is quite difficult to see that this iron has the desired thickness, if the screws are properly set, and if they were not driven like nails with the hammer. While the architect constantly deceives concerning the form, the true purpose, he is the first dupe of his o own deception. It has come to simulate everything so well, t that one i easily deceived in the quantity or quality. Or that men dispense with placing, what they themselves seek to fully to conceal from the eyes.

But let us return to our smiths. If they made hinges with particular care, they no less attached importance to the perfect execution of the hinge-pins that supported them. These a are forged from the best iron, properly rounded, and almost always are slightly conical.

We have stated that for the great doors shutting into rebates, the hinge-pins are set at the same time as the courses of the jambs, in a bed joint, so as to be certain to be fixed. F For doors of less importance, that must be opened entirely i into the interior, the rebate being near the front (Fig. 21) at A, the pin of the hinge must be sufficiently detached to allow the full swing of the leaf; further, it is rarely possible to set them diagonally in the angle A, because one would risk causing the facing stone to split. Then frequently these hinge-pins are arranged as shown in our Fig. The hinge-pin has a tail B fixed at the bottom at b, which thus forms a sort of corbel, whose top is held by the eye c passing over the pin beneath the eye of the hinge. At D is sketched the elevation of the hinge on the top rail of the door. At E is sketched t the section of this rail and the planks with their battens. By this means the weight of the door does not risk bending the body of the pin or tearing it from the fastening. When it is necessary to swing a leaf of a blind or of a door against a s surface distant from the rebate, as in the example of Figa 22 a A, the pin of the h nge being placed at a, at the middle of

of the distance b c, it is clear that not only the nack of the hinge must be bent square, but the shank of the hing must be very long; then the fastening at d cannot have any strength. The pin m is then forged at the end of the corbel C, which has its anchor o; then a brace p passes over the lower part of the pin and is fixed at s, serving as a washer at the eye of the hinge g; en this manner the leaf V swings to V' without straining the long shank of the pin and without risking tearing out the anchors.

These examples will suffice to show how in these works of d detail, the architect of the middle ages devoted the care, t thought, attention and logic, which preside over the entirety. If the need or the fact requires the use of arrangements that attract the eye and assume importance, one does not seek to disguise these arrangements, but to decorate them by giving t them the appearance, that indicates best their reason for existence. Thus art was introduced everywhere, and architecture w was formed, because it continually affirms the true and sincere principles that direct it.

We shall occupy ourselves with fastenings for doors and other pieces of ironwork, that are fixed on the leaves of doors, either to keep them closed or to pull them open.

FERRURES. (Loquets, Poignees, Serrures a bosse, Targettes, Verrous, Vertevelles.

Fastenings. (Latches, Handles, Locks with bolts, Bolts, Pins, Double Bolts.

The lodest fastenings known to us only date from the 12 th century; those are fastenings termed projecting, i.e., with a case made by the hammer with beveled edge and placed on a plate (pallatre),[1] whose bolt [2] is outside the plate, so that the b box is on the outside and the bolt inside the leaf.

Note 1.p.318. The "pallatre" is the wrought iron plate or sheet iron on which are fixed, i.e., set the riveted pieces of the mechanism of the lock. Pallatre is now feminine, but Jousse makes it masculine. Pallastrum may be the spelling of pallatre, and which means a coarse cloak, is neuter; but we retain the masculine gender for that word.

Note 2.p.318. Men say today pene (bolt), but the word pesle that Jousse uses, it seems to us should be retained in this A Articel on old ironwork. In fact pesle comes from pessulus

(piece of wood for barring a door), and according to the meth-od of contraction in the French language, should be written pesle and not pelle as Jousse writes it, but pessulus could n not be pene.

The keyhole is then pierced in the plate over the bolt.

Fig. 23 presents one of those locks.[3] The bolt A slides between two strips reveted on the plate and is held by two clips B also riveted. The catch G receives the end of this bolt, w when the door is fastened. A movable handle P serves to pull the door, when the bolt is out of the catch G. The little knob C serves to slide the bolt when the key has been turned to r raise the tumbler. The box is sunk into the leaf V. Strips are riveted on the plate to strengthen it and also to guide the key, if it is desired to open the door in the darkness. It is to be well understood that all this is placed in the interior. If the door be thick, the box is sunk in the thickness and is not seen externally. If the leaf is thin, the back of the box is visible externally. This sort of lock usually has but one keyhole. Fig. 24 presents the very simple mechanism of these locks. The box is enclosed by the letters a b c d. The internal bolt p is attached to the external bolt P′ by two strong rivets, that slide in the slot cut through the plate, when one wishes to open or close the bolt by means of the button just mentioned. If it is desired that the bolt cannot slide, a turn of the key drops the dog l as shown in the Fig. and stops the bolt. If it be desired that the bolt P′ may remain movable like an ordinary bolt, a turn of the key from e to f presses on the spring v and disengages the tumbler, which being raised allows the inside bolt to slide. Nothing is simpler than this mechanism, still employed today. These tumbler locks are the most common kind, and scarcely change form till in the 15 th century. Then the plate that serves as keyhole and on which slides the bolt visible externally is sometimes decorated by ornaments of wrought iron finely cut. Between these ornaments and the plate is placed a piece of red cloth held by the rivets that retain the perforated work.

There still exist many locks of this kind, and we give an example taken from the crypt of S. Sernin of Toulouse. [1]Here the bolt is enclosed in a box or case (see a b in the section). At H is the button in the form of a shell, that allows the bolt

to be moved, when the turn of the key is given. One perceives the little rivets that serve to fasten the sheets of wrought iron on the bottom plate d. The piece of cloth interposed is then visible in the openings. Ar in the preceding examples t the edges of the plate are reinforced by a twisted bar. At B is the handle for pulling, and at C is the profile of the button A. This sort of ornamentation produces much effect at small cost, for nothing is easier to make by a skilful workman, than these sheets of wrought iron prepared cold with the hammer. In this example are no welds, all is riveted excepting t the button A and the cross-piece of the handle. The little leaves of the handle B themselves are held in the bow by little lateral projections set in indents in bending the iron of the handle hot before welding its ends at the cross-piece. But before going farther, it is necessary to state that these kinds of fastenings with bolts were not the only fastenings fabricated during the middle ages. The projecting lock with bolt moving inside by means of a key, like what we call today locks with dead bolts, were already in use about the middle of the 13 th century. There were locks for one or two turns; they w were those called "treffieres", i.e., that could only be opened from one side, or sometimes "benardes", i.e., having two keyholes. The lock that we give here (Fig. 26), and that we found still attached to the door of a house of Angers dating from the end of the 13 th century, has two keyholes. The door shuts into a rebate without a frame, and that rebate being wide and deep (2.0 ins., see at a); so that the hand should not be hurt by the jamb when the key is turned, the box of t the lock is placed far from the edge of the door (see the horizontal section A), and the bolt slips in an outer box or case B before entering the hole G. The lock is set on the inside of the leaf, and on the exterior is an escutcheon of wrought iron. Consequently the box of the bolt is also placed inside the l leaf. The case or box is beveled on two sides and is riveted to the plate E, which is held to the leaf by a great number of nails passing through holes punched in the cut edges. The rivets that hold the springs and their clips are also fixed in the plate, but those of the standards are also riveted on the box of the lock and combine with its decoration, consisting of sprays, rods and engravings. A spray in form of a V guides the

end of the key into its keyhole; another spray welded at its base on a bottom twisted rod, strengthens the box and thickness at the rivets and standards, for then no screws were employed in locks.

Note 1.p.320. This grille and its lock were replaced in the 16 th century, but belong to the fabrication of the middle of the 15 th century.

At G is presented the interior of the lock; at b is the hole for the shank of the key with its wards riveted on the plate; at c are the standards that serve to maintain the top of the box of the lock on the plate; at d is the bolt with its tumblers and its springs. The bolt is assumed to be closed with one turn.

From the 15 th century one already finds locks termed latch locks. Besides the dead bolt these locks have a latch mounted on the plate below the bolt and opening by a knob or lever. there still exists a lock of this kind on the iron door that gives admission into the cabinet of Jacques Coeur, in the m mansion of that name at Bourges. On the plate is mounted a b bolt like the kind described above, but with a single turn, and below the bolt works a latch with spring, opening inside by a lever, but opened from the outside only by a key; so t that on the outside by closing the door it is fastened with no need of a turn of the key to throw the bolt into the catch.

There even exist locks only consisting of a latch, that at need could be made immovable, and which took the place of our locks called with a turn and a half.

Here (Fig. 27) is a very pretty lock of that kind, dating from the end of the 14 th century, and that we sketched on the door of a house of the city of Lalande. The mechanism given in our Fig. consists of a latch with end A mounted on a p pivot a. A spring B maintains this latch in a horizontal position; then its end c is not an inverted catch fixed on the frome or in the rebate. If one desires the door to remain closed as it would be by a bolt, a turn of the key is given from d to g, and then the tumbles h is caused to descend so that it bears on the tail of the latch at i; therefore the latch cannot swing. Ef the latch is desired to remain movable, a turn of the key is given from g to d. The tumbler h rises by swinging on its pivot s and the latch is movable, like the bolt of

half turn lock. It suffices to raise the tail of the latch f for its end c to escape from the catch. Pushing the leaf itself closes the lock. Here (Fig. 28) is the box of this latch lock. At A is seen the tail of the latch, which extends beyond the box of the lock and allows the end a to escape from the catch b, that we have drawn below its proper place to show the end of the latch. The box of the lock being placed inside the room, there is ounside a thumb-piece (B in the profile), that raises the tail of the latch when a turn of the key has not made it immovable in its catch. At D is sketched the rosette on which is mounted the lever B. As in the preceding examples, the ornaments that decorate the box receive the rivets of the parts inside and give them more strength, than if they were made merely on the plate of the box. The edges of it are also ornamented by projecting strips notched with the chisel, which gives it great resistance.

These works of locksmiths do not surpass the ordinary, and we chose them expressly among examples of common fabrication. Our museums still contain a good number of locks of the 15 th century, which have a richness of composition and a perfection of execution much superior to these last examples. But we must consider the art of the locksmiths only from the point of view of its application to architecture, and consequently not seek to reproduce works exceptionally reserved for furniture of luxury. It is only necessary to emphasize the procedures of fabrication employed by locksmiths during the middle ages, a and to give an idea of the forms, that they knew how to give to the material employed.

Perhaps in the works of the locksmiths one finds the clearest expression of the logical minds of the artists and artisans of the middle ages. Iron is not a material that lends itself to be nearly right. In the art of the locksmith each part must have its function, possess the degree of strength necessary without excess, for the material is costly and difficult, particularly if the workman possesses none of the powerful m machines now at his disposal, and that too frequently supplement defects in conception by the master, or lack of skill in the forger. When the locksmith has neither the file nor machines for planing, rolls nor even the screw, and it was necessary for him to assemble parts of quite small thickness, his

mind was naturally led to contrive, to seek procedures compatible with the material and the mode of using it. We do not p pretend to state that it is necessary to reject the mechanical means offered by modern industry, but it is often imperious h that the extent and power of those resources make the mind of the constructor indolent, if it be necessary to combine locksmith's work according to the material and the principles of construction strongly imposed by its nature.

The customs introduced in architecture since the 17 th century by the false classical taste have taught us first of all to deceive. To imitate stone or wood with plaster, wrought i iron with cast iron, carpentry with ironwork, to conceal the necessities of construction, to torture each material to give it an appearance not belonging to it, is nearly what composes the art of the architect for a certain number of artists and for a great part of the public; and it must be confessed that the development of industry applied to the work of building f favors these deceits. Having less natural resources at their command, our artisans of the middle ages were indeed forced to require from their intelligence what could not be supplied to them by an industry in its infancy. On the whole, art did not lose in that. Ready made work of ordinary form and common in conception did not and could not exist. It was simple or rich, poor or luxurious, but it was always the product of intelligence developed according to the nature of the object i itself, and that effort was reproduced daily with greater perfection or more complete experience. It was not to supply to a machine a bit of material, that it repeats brutally in the same form, it was essential for the mind and hand of the artisan to set to work; and it was only to obey that feeling natural to a man, which pushes him on to continually seek the better, and that artisan, even in copying himself, constantly introduced in his work either a more complete idea, more judicious calculation, and execution more logical, simpler and n nearer perfection. We do not demand that machines be destroyed, but we desire them not to take the place of intelligence.

The more intractable the material that man works, the more should it be impressed by the mark of his will. It expresses the power of that will only if the artisan takes account of t the properties of that material, that he renders docile by c clearly manifesting those properties. If man by force of ind-

industry succeeds in making us accept a bit of iron as a bit of wood, and from the detail of the entirety, and work in iron or carpentry for a work in masonry, we say that he badly employs his intelligence, and that he abuses the material instead of utilizing it.

In all the examples of locksmith's work presented above, it could be observed that hinges, attachments or keyholes of locks, etc., are never sunk in the joinery. The wood remains intact, and the ironwork is set on the surface without injuring it. There was an advantage in that method from the point of view of the fabrication, in that it was necessary for this ironwork intended to remain visible, to be fashioned with care and be substantial; from the point of view of art the advantage was at least as important, for the artisan contrived to find combinations suitable for the material, the object of the place. The form adopted being always seen, it must be pleasing and indicate the function. On the contrary, if the greater p portion of articles fo fine ironwork are sunk into the wood, like what we call hardware today, it matters little whether these articles have a proper or pleasing form; it even becomes quite difficult to recognize whether these objects are well fabricated, rude or bad, for the architect cannot examine singly the pulls, angles or locks of a great building before they are set. The fastenings of these articles being sunk in the joinery, then covered by painting, the defects are concealed and are only discovered by the accidents caused by them. Thus by concealing a good part of the ironwork from the eyes, one has promoted deceit, negligence and fraud. For one liar, a liar and a half; it is too natural. To satisfy the rules imposed by the majestic classicism, that so strongly dominates us, the architect still conceals and disguises stairs, chimney flues, water pipes, and (descending to details) the necessary ironwork. Judging not without reason, that what must be concealed would just as well not be there, or at least only exist in an imperfect state, workmen do not make it a fault to falsify or omit those articles, which a majestic modesty would conceal from the eyes. Thus it is often necessary today to recall the locksmiths into the recently completed building, to repair all the hardware so well concealed under painting and even gilding; [1] for after all, it is necessary for a door or window to swing on its hinges, and its fastenings; for a

bolt or lock to act; that the screws shall hold, and the iron of the hardware to have suitable thickness to resist use.

Note 1.p.327. Screws are certainly an excellent invention for fastening fine ironwork on joinery, and the use of the screw in hardware only dates from the end of the 15 th century. But thanks to the care taken today to conceal all the o attachments of the ironwork, the workmen drive the screws with a hammer into holes made with an awl. Nails would be better. Thus an improvement becomes a cause of bad work, when its use is not frankly emphasized.

When all the parts of fine ironwork were visible; when being visible they even contributed to the decoration, it was necessary to give them a form in harmony with their purpose, and to watch over the good execution of works, that the least experienced eye could verify constantly. Less preoccupied with the majestic than we are, the masters of the middle ages sought for the works of hardware the simplest combinations, without ever concealing them, and sometimes these works are true masterpieces, considering only the art form adapted to the use.

In fact as the article of ironwork, nothing is simpler than the old latch; and yet for one of those latches to act well a and long, it was necessary for a plate on the leaf to prevent friction of the latch on the wood; that the lever acts without effort under the pressure of the thumb; that the latch have p proper weight to fall into its catch, etc. In the example here given (Fig. 29), [1] the latch is pivoted on the bolt A with two washers, one on the wood and the other under the head of the bolt, falls into its catch B if the leaf is closed, slipping on the inclined plane of that catch. A support C is riveted on the plate and with a double eye receives the lever D. On t the exterior another lever E, shown at E′, passes through the leaf and rests its end under the latch beside that of the interior. From the exterior it suffices to press on the lever E and to push the door to open it; bu in the interior since one wishes to pull the door toward him, the support C permits passing the fore finger between it and the plate, resting the t thumb on the lever D, and to pull the door at the same time that he lifts the latch. The plate is cut to form ar ornamentation according with the places of the nails. We givi two other forms of thumb-pieces at G, and at H are two levers,

that instead of being placed beside each other, the outside one acts under the end of the inside one.

Although nearly all old hardware has been destroyed, there still remain to us examples sufficiently numerous to show with what relative care it was treated in even the most ordinary buildings. Locks, handles and latches that one finds still attached to the old doors of houses, mansions and churches of the middle ages, discover an industry full of resources. The variety of the forms of these objects is sufficiently great, that it would be impossible for us to present to our readers a specimen of each; we must therefore restrict ourselves to the most essential. Perhaps some one will even think that we enlarge too much on these works of fine ironwork; but men are so disposed to believe in the rude imperfection of the industries of the middle ages, that it has seemed to us necessary to show their products, no destined for luxurious monuments but for ordinary houses. The industry of hardware was already very developed in France in the 14 th century, but also in S Switzerland, Bavaria, Bohemia and on the banks of the Rhine, while at that epoch it still remained barbarous in Italy. It was only about the middle of the 15 th century that the Italian cities in their turn set themselves to fabricating iron articles of great refinement in execution and of very good e execution. However it must be stated, that in the peninsula that beautiful industry never knew hou to ally art to necessity if required, as did the artisans of france. The forms of the fine ironwork of Italy are often very happy, but have the defect of not according with the purpose. For our part, in all that concerns the art of architecture, we think that a pleasing execution alone, unless reasoning has intervened, if the harmony of form and the need is lacking, cannot constitute a complete work. We have with us the Greeks of antiquity; all articles that they have left us are profoundly permeated by this twofold character; a very vivid and very correct expression; an execution in accord with the object and its purpose.

This projecting lock with dead bolt (Fig. 30) whose plate is cut in a manner to fasten it well to the leaf, whose external face is decorated by out wrought iron leaves, with stems guiding to the keyhole, strengthened by a cross-piece to resist pressure, as shown by the section A, certainly has a form

perfectly appropriate to the object and the nature of the material employed. These leaves afford a hold for the rivets of the mechanism, that decorate the iron plate while connecting it to the wood that it covers. The keyhole B is slightly sunk into the leaf as shown by section C, and is it not a pretty design indicating the material need, lending itself exactly to the function fulfilled? Do not the artisans of the 15 th century that fabricated these common objects make us see that they reasoned, that they have left on these assembled bits of iron the trace of their intelligence and art? [1]

Note 1.p.331. This lock is a model that is very frequently found in the buildings of the 15 th century on the banks of the Rhine, in Switzerland and Bavaria. The keyhole comes from a door of the cathedral of Prague (a portion built by the French architect Matthew of Arras, 14 th century). A similar k keyhole is seen on a tabernacle of the cathedral of Augsburg; another is nearly similar, on a leaf of the church of S. Pierre of Strasburg.

This pulling ring (Fig. 31), whose ground under the wrought iron foliage is covered by red cloth; is it not a charming and decorative composition? [2]

Note 2.p.331. From the church S. Pierre of Strasburgo Some ring is on a leaf of an ambry of the cathedral of Munich.

A piece of red cloth also covers the ground beneath the foliage of the cross-piece of the preceding lock (Fig. 30).

Besides the various kinds of locks, of which examples have just been presented, men also employed long bolts with hasps for fastening the leaves of great doors. Those bolts being s shot inside evidently could not open from the outside, like locks with double keyholes. They served to bar carriage doors, the great doors of churches, the leaves of doors of enclosures, and nothing appeared externally. The horizontal bar forming the bolt slides in two clips or cross-fieces fastened to the leaf and engages in a catch if the leaf shoots into a rebate, or in a third cross-piece, if the leaves are double. The bolt being shot, the staple of the hasp falls into a hole pierced in the box of the lock above the keyhole. A bolt passes through the staple by a turn of the key, if it is desired to fix the bolt. This sort of bolt with box lock had the name of "vertevelle." Fig. 32 presents one. The bolt H is forged poly-

polygonal and not round, which facilitates sliding in the cross-pieces or clips. The hasp is assumed set in the hole of the l lock fastened. If the door has a single leaf, instead of the cross-piece B a catch is fixed in the stone rebate or the wooden frame. Although the cross-piece B″ has been slipped on the bar, the end C of that was forged and cheseled. That head serves to draw the bolt when the hasp is raised. A stop E is forged on the bar to stop the bolt, so that its end D cannot slip out of the cross-piece F.

These hasp locks are not rare, and many old doors still have them. This one was placed on the inside of the door of the church of Savigny-en-terrepleine; [1] but the bolt falls into a catch fixed in the mullion.

Note 1.p.333. The church of Savigny-en-terrepleim dates from the last years of the 12 th century. The hasp lock (Fig. 32), seems to belong to the middle of the 13 th century.

Besides horizontal bolts forming bars, it was necessary to furnish the leaves, whether single or double, with vertical bolts at bottom falling into catches as well as to make breaking open far more difficult. These bolts consisted of a vertical iron bar sliding in two cross-pieces riveted on plates. At its upper end the bar has a movable ring, and allows it to be raised to lift its lower end from the catch.

Fig. 33 presents one of these bolts, whose form is well known. When it is raised and the leaf is opened, so that the end of the bolt may not drag on the floor, the ring is slipped on the hook A. [1] Thus were also made top bolts to hold the upper part of the leaf, whose ring was replaced by a hasp or by a clip into which entered the bar of the horizontal bolt. But those top bolts were moved with difficulty, and horizontal or vertical bars were preferred to them.

Note 1.p.334. This bolt comes from a door of the church of Semur-en-Brionnois, and belongs to the ironwork of the 14 th century. One can further see a great number of them in place in our old churches.

During the middle ages special attention was devoted to the ironwork of the leaves of fortified gates. There remain in p place only a very small number of those works in iron earlier than the 16 th century; but by the fastenings one can judge of the importance of the means of closing employed during the 13 th

14 th and 15 th centuries for the gates of cities and castles. certain leaves [2] were held by two wooden bars entering the w wall, by a bar fixed on a leaf (Art. Barre), by a top bolt and a hasp bolt. The frequent use of war machines for casting projectiles, the operation of draw and lift bridges,and portcullises had familiarized smiths with certain mechanical means, very simple in principle but ingenious, as now in fine ironwork on the contrary this was visible, and because of that was easily maintained. The custom adopted in every strong place, of handling great carpentry works with rapidity, required a certain accuracy in the ironwork and great strength. Great rack bolts for fastening the leaves of very heavy gates 13.1 to 16.4 ft. high were common. We saw those bolts some twenty years ago attached to the leaves of gates, notably at Verdun. Some still exist in Germany at Nuremberg. Fig. 34 explains the system adopted. A heavy bolt of square iron is held at the top of the stile of the leaf by four clips a. Beside that bolt are strongly spiked two pedestals b receiving between them a toothed lever c, that swings on an axis d. Two cogs are on the bolt to engage with the three teeth of the lever. At its end is a bolt passing through the fork of a twisted iron rod descending to reach the hand and terminated by a handle P furnished with a hasp e. Drawing the rod downward naturally shoots the bolt that enters then its catch g; on the contrary by pushing the rod upward the bolt leaves the catch. When the bolt is shot into the catch, the staple of the hasp shuts into the hole of a lock, that also receives the hasp of a horizontal bolt. A turn of the key prevents the working of that bolt and the rod. In fact, this is only a sort of powerful cremona bolt, whose mechanism acts perpendicularly to the face of the leaf instead if acting parallel to that face. At A is represented the mechanism in perspective, the rod having been drawn to s slide the bolt into its catch. Two little cylinders h or rollers free on axes are sunk in the leaf under the bolt to prevent its friction on the wood, occasioned by the pressure of the gearing, and it greatly facilitates the working to open or close. Twisting the square bar t gives it the stiffness necessary for it not to bend if it is long, when necessary to push it up to draw the bolt. Certainly all that is a mechanism not very advanced, but it is ingenious, stable and visible, eary

to operate, and could be executed by any smith.

Note 1.f.334. This bolt come from the door of the church of Semur-en-Brionnois, and belongs to the locksmith's work of the 14 th century. Further, one can also see a very great number in place in our old churches.

Note 2.p.334. Notably those of the gate of Narbonne at Carcassonne.

One cannot regret too much the daily disappearance of all these objects of the locksmith's work of the middle ages in o our old edifices, religious or military. Many of them were still found 20 or 30 years since; they have now become very rare, Worn out, out of use, attached to wormeaten wood, they are g generally cast away is junk, when repairs are made. Yet it wo- would be interesting and useful to gather those articles in a museum, that would be very rich now and very instructive for our artisans in ironwork. But we have not come to regard museums as collections of real utility for our industry, and they still are in France only masses of objects intended to satisfy curiosity of amateurs or archaeologists, or also are places of study for artists, painters and statuaries. Yet art does not live among a people unless it penetrates everywhere, when it is found as well on the mantlepiece of a great lord and on the kitchen table of the workman, on the door knocker of a palace and on the bolt of the humble window of the petty citizen, on the hilt of the sword of the general as on the bu buckle of the belt of the soldier. However ordinary are those objects of the metal work of the middle ages, art appropriate to the material finds its place there; art was a need for all, not a matter of luxury reserved for some privileged persons. What was not found then was the art of slop-work, the appearance of luxury given to an object of little value.

We have shown a certain number of examples of fastenings of the leaves of doors. The examples of fastenings of sashes are much rarer; that joinery is lighter than that of the leaves, more exposed to storms, and is more rapidly destroyed. It is necessary for us to rummage among old iron to find some remains of the fastenings of sashes. The interest that has always seemed to us to be attached to the old fabrication of iron, even when there were everywhere sold the most beautiful forged ironwork, to substitute for it cast iron in such bad taste,

long since led us to collect a good number of drawings of that old ironwork so greatly disdained, ironwork that disappeared under the hands of most restorers of castles during 30 years. Thus at the castle of Chastellux near Carre-les-Tombes were seen in 1839 sashes of windows of the 14 th century equipped with their great bolts. It is true that this ironwork was out of service, the sashes were completely decayed and fixed shutters were added, but the parts of their very simple mechanism were all preserved. Those bolts, or rather cremonas (Fig. 35) consisted of a bar of flat ibon 0.8 by 0.4 in. On that bar w was fixed a handle a (see the entirety A). At b b the bar formed loops into which passed the scrolled tails of two latches. By raising the bar the latches left their catches; pulling it down by means of the handle the latches were made to enter their catches; then the foot of the bar formed a bolt that entered a lower catch d. Clips e were held by two ends and those at f held by one, maintained the bar and directed its movement. Details will show the system adopted in the shape of this bolt. At B is the section of the stile of the sash with the loop of the bar at E, the tail of the latch passing into F, the keyed bolt serving as a pivot for that latch at C, and the catch at D. At G is sketched the face of a latch with its tail entering the loop of the bar. The dotted line indicates the position taken by the latch, when the bar is slid upward by means of t the handle P. At G is traced the section of the latch with the loop of the bar and at g is the catch. At H is drawn a clip w with two ends; at I being one with a single end, its section being at i. It will be noted that those clips with one end are so made to only fit on the wood of the sash. At K is represented the lower end of the bolt with its catch L nailed on the sill of the frame. A perspective sketch M explains the position of the latch and its tail loosely entered in the loop of the bar.

This cremona bolt thus holds the sash in its frame by means of three fastenings, two latches and bottom bolt. By the aid of the catches and the bottom catch, this sash could be resttored if it warped. The smith gave to the handle P a form that permitted sliding the bar up to open or down to close it. The bars were forged quite roughly between the parts destined to slide in the clips, but the handls, latches and clips were fashioned with the hammer and chisel with greatest care.

Fig. 36 presents various fragments of ironwork belonging to about the middle of the 15 th century. At A are the remains of a cremona bolt very probably belonging to a sash; [1] a handle A belonging to the same bolt moves the two links attached to an axis O, and consequently the two bars C C′ in opposite directions. By pulling the handle B down, the bar C rises and enters the upper catch; the bar C′ lowers and falls into a bottom c catch, just like the bars of our wooden spagnolette bolts. At D is sketched a profile of the mechanism with the bolt and its key; at B″ is the front of the handle; at E is one of the clips very finely designed and forged.

Note 1.p.338. Remains collected from a dealer in old iron at Rouen.

Another clip with a plate is shown at G, [2] also belonging to the 15 th century and serving to direct the bolt. [2]

Note 2.p.338. Also from an old iron store.

At H we present also an excellent system of hinged latch frequently employed in the 14 th and 15 th centuries to fasten s small window sashes. The catch is let in and strongly nailed at the side of the frame in its rebate. The hand has great f force in opening or closing this latch by means of the bent lever, projecting sufficiently to avoid friction of the fingers against the wood of the sash. Further, these latches very strongly fix the sash in its rebate.

The perspective sketch K gives a very pretty handle of a d door of the same epoch and attached to an inside door of the church of S. Pierre at Strasburg. This sort of handle is quite common in Alsace and consists of two horizontal rods h h, that pass through the leaf and are riveted on a plate on the other side. A cylinder of wrought iron l, decorated by mouldings and various ornaments, is also riveted to those two horizontal bars A scroll, through which pass he bars, takes the place of the plate inside and is nailed on the leaf. At L we give the profile of the cylinder, and at N is the plan of the top n, composed of two little plates of iron riveted in cross form and f forming a bud, and the four cut leaves also of wrought iron. On each leaflet is riveted a small stem with a bud, nearly as a linden seed is attached to its support. All those last works in iron are executed with great perfection.

It remains for us to speak in the matter of the suspension of

fastening of doors, of bolts, handles, angles, squares, etc. The name of "targettes" is given to small bolts placed on sashes of windows, when of small dimensions; to leaves of blinds or cupboards. Very rarely during the middle ages and till the 15 th century did the sashes of windows have dimensions exceeding 3 or 4 ft. high by 2 or 3 wide, since the windows were divided by vertical mullions and transverse bars of stone. (Arts. Fenetre, Menuiserie). Therefore to fasten sashes of such moderate dimensions, only small bolts were needed and t the use of cremona or great top and bottom bolts was rarely ordered. Thus the little bolts are much more common in old p public or private edifices, than spagnolettes or latches. For the fastenings called spagnolettes, their use in France only dates from the 18 th century. For fastening the sashes of windows of great dimensions and with two leaves, top and bottom bolts, latches, bars and cremonas were combined as presented here. It should not be forgotten that during the middle ages window sashes in two leaves were not made, since the windows had stone mullions, if they exceeded moderate dimensions. The cremonas given in Figs. 35 and 36 were placed on a sash of o one leaf, holding it in its frame, or simply in the rebate of the stone mullions. In our days the spagnolette has been abandoned to return to the cremona, that however are not of modern invention, and that have not ceased to be used in Italy and in certain parts of Germany.

Small bolts were then the ordinary fastenings of sashes of small dimensions; one or two were placed in the height of the stile, and sometimes these bolts fastened at the same time both the sash and the inside blind as we shall soon see. A great variety of bolts is found, and it seems that the locksmiths were pleased to give to that ordinary article the most original and graceful forms.

Here (Fig. 37) are some examples of those bolts set on sashes of windows. The bolt A [1] consists of a case of trapezoidal section in which slides a bolt of similar section with acute edges removed. The face of the case is slottel to allow a stem fixed in the bolt to pass, to which is riveted freely a movable handle. Two clips with prongs a strengthen the case at its ends, and allow fixing it to the stile of the sash by means of points b clinched inside. The bolt simply enters a plate with

hole fixed on the mullion, for here the window has no frame. This other bolt B is in the same case; its bolt enters a plate with catch; its case is held like the former by two pointed clips. The handle instead of being movable consists of an animal neatly forged and chiseled, which being well in hand facilitates sliding. [1] At d the bolt is presented in profile; at e in elevation (the animal being removed). The sketch g gives its section. The stems of the movable handle of the b bolt A and of the fixed handle B are riveted to the belts before the back plates are riveted to the cases; that is all simple.

Note 1.p.341. From the leaf of the window of a house at Flavigny, 14 th century.

Note 1.p.342. Found at Cahors attached to the leaf of a modern cupboard. This bolt seems to belong to the middle of the 14 th century.

The bolt C belonged to a sash of a window furnished with a frame, since the catch h exists [2] and was fixed to that frame. The handle is in form of a leg and is movable (see section l). The case is not trapezoidal but rectangular in form; it is no longer fixed by prongs, but by nails passing through the edges of the back plate, to which are riveted the clips. As before, this back plate had not been fixed when the bolt was adjusted in the front of the case, and the stem bearing the pin of the handle was riveted. These articles are delicately wrought in good iron and strongly made.

Note 2.p.342. Drawn in 1841 in the old palace of the counts of Nevers at Nevers, now palace of justice, end of 15 th cent-

But the sashes of windows during the middle ages were most generally furnished with inside blinds that closed in parts, so as to admit more or less light into the apartment. (Art. Menuiserie, Fig. 20). Those blinds were fixed to the frame, but more commonly on the opening sashes, so that it was not necessary to first open the leaf before opening the window. In the first case the bolts were so arranged, that it was absolutely necessary to open the blinds to open the window, in order not to risk by negligence injuring the handles or pivots of the window sashes; but also these bolts fastened the window sash and blind, either or both as needed.

Fig. 33 shows us one of those bolts. [3] Here the bolt does

not slide in a case but is slotted lengthwise at both sides of the handle, allowing to slide in each slot a nail guide a ending in double prongs clinched on the back of the rail of t the sash. The catch b is fixed on the frame, but so that the bolt extends beyond it the distance e f. This bolt is furnished with two ears h h′ (see section at h″) cut out underneath. When it is desired to close a blind v, the bolt is pushed to the end of its course as shown in the sketch; the leaf of the blind is closed, its angles having projections p: then the bolt is thrown partly back from f to e; the ear h′ then rests on the projection P. Wishing to close both sections of the blinds at once, the ear h will also rest on the projection at the lower angle of the upper blind. It is clear that in this case, to open the window it is necessary to open the blinds, since their thickness prevents the bolt from leaving the catch. At A is sketched the section of this bolt with one blind shut, and at B is the mode in which the projection is fixed by nails on the angle of the blind.

Note 3.p.242. From a window of the old bishops palace of Auxerre, now prefecture. This bolt appears to belong to the 14 th century. We drew it in 1843; it was still on an old sash deposited in the beautiful ceiled attic belonging to the old great hall.

It is scarcely necessary to state, that in this sort of window sashes there is a rail between each blind, and that there are as many bolts as rails. The slotted bolt slides on a plate whose edges have nails.

When the blinds are hung on the window sashes and not on the frame, they are frequently held by separate bolts, that allow the sashes to be opened without opening the blinds.

Here again (Fig. 39) is a system of fastening a sash with blind, that was adopted in the 15 th century in the provinces of the North, where at that epoch the hardware industry was g greatly developed. This system consists of a vertical rod (see the entirety of the stile of the sash at A), with squares at its ends that move two two bolts with racks, one at the top and the other at bottom. Four projections are riveted to the rod and enter loops attached to the angles of the two blinds separately closing the two glazed panels of the window. A handle permits turning the vertical rod a quarter circle. By ro-

rotating this rod it throws both bolts into their catches fixed in the stone rebate and enters the projections into the loops of the blinds, if it be desired to fasten them, just like the spagnolettes still used a few years since.

At B is sketched the upper end of the vertical rod with its square, its bolt with rack and one of the projections. At C the rod is presented in profile with the stile of the sash. At D a horizontal section illustrates the mechanism. At E is presented one of the clips holding the rod and in which it rotates. There is seen at F one of the loops of the blind and at G is the handle in elevation and profile. On the section D is indicated by a a' the movement of th handle to rotate the rod, throw the bolts and insert the projections in the loops.

The vertical rod is reinforced at the points where it receives in holes the squares, projections and the handle, the latter being riveted. Between the clips in which it turns, this stem is forged square and twisted spirally to give it stiffness. At H is sketched another handle that grips the rod and is fixed by two pins. The rod is flattened and drawn out, then scrolled around an iron rod (see horizontal section h).

The clips with double points clinched on the back of the stile (see at d) pass through a plate p nailed on the wood, so that the movement of the rod cannot enlarge the hole made in the stile. At the ends these plates also receive the riveted clips of the bolts (see at g).

This ironwork from remains collected in our cities of the North and in Belgium must present many other varieties; we cannot pretend to give all of them, for a special treatise w would be required. Perhaps some one will think that we emphasize too much this branch of building industry? But little attention is generally given to our old ironwork, whose form is always so well suited to the material; the ignorance that has caused to be thrown into old junk so many objects fitted to arouse the intelligence of our artisans; the erroneous ideas found among architects concerning those industries from which we have so much to learn; the abuses that facility of the means of execution introduces into modern ironwork, all that has led us to multiply the examples.

We shall also say some words on pulls, corners, simple or p pivoted angles, all articles of the hardware of buildings, that

are carefully treated by those artisans of the middle ages, a and that have a certain importance.

During the 13 th century window sashes were most frequently without frames and shut into rebates in the stone. Those sashes were pivoted at top and bottom, entering sockets set in t the stone itself! Each pivot was welded to a square fixed on the edge of the sash and extending on its inner surface.

Note 1.p.346. The style of these sashes was even frequently fitted with wooden pivots preserved at each end.

Fig. 40 represents at A one of those corners with a pin or pivot a. The corner is reinforced at the angle, let into the vertical and horizontal edges of the sash, and projects on the face by the little spur b. At B is seen a different kind of pivot with bands clasping the inside and outside of the sash with a projection forming a square. Fig. 41 presents an actual hinge, whose part A is nailed on the frame and the part B on the sash. [2] The plates of the hinges are visible, perforated and engraved. One then recognized the inconveniences of ordinary nails, and the locksmith took care to place two nails with rectangular and flat points as shown by the detail a. T Those nails were clinched inside and could not split the wood, (the point being flat and following the grain), and by means of the square head strongly holding the plates near the pin b and eye c.

Note 2.p.346. From a window sash of a house at Flavigny. T This hinge dates from the 14 th century, and the sash shuts i into a frame.

When the casement sash had a very great height (6 to 7 ft.) the hinges were long and had two separate eyes to prevent bending the wood. Fig. 42 shows one of those hinges, that appears to belong to the end of the 14 th or beginning of the 15 th centuries. [1] The pin is free between the eyes, visible and is ornamented by a spiral of round iron coiled around it, which is also loose. To unhinge the sash, it sufficed to raise the pin upward.

Note 1.p.347. From a window sash of a house at S. Yriex. T The sash shut into a frame.

Fig. 43 gives a hinge A, a Hinge B and a cross hinge C attached to the door of a chapel of the church of Semur-en-Auxois. (Art. Menuiserie, Fig. 15.). The door shuts into a rebate in

the stone, and the hinge A turns on a fixed hinge-pin. Instead of nails are set staples, each with three split points clinched inside as indicated by the perspective sketch D. These staples had the advantage of perfectly holding the plates, as well as or better than screws, and of,preventing the hinges from w wearing their atachment by use. This ironwork dates from the middle of the 15 th century.

At G is sketched a beautiful corner hinge of the end of the 15 th century, [1] maintained by two vertical bars, a detail of which is seen at g, nailed on the plates to give them more resistance and to connect all the nails. Small points also fix the projections on the wood. Very probably the points of the nails passing through the bars were clinched or riveted on the back plates.

Note 1.p.348. This piece of hardware was set on a leaf, very probably of the cupboard, or a leaf of an inner door of a room. We found it with a dealer in old iron at Paris.

The Renaissance produced hardware of rare perfection of execution. We preserve but a small number in France, except on furniture of that epoch. On the contrary, Germany, Belgium and Switzerland possess a prodigious number of pieces of ironwork of the end of the 15 th and the beginning of the 16 th centuries, executed with infinite art. The grilles of the tomb of Maximilian at Innsbrück, the grilles of the chapels of the cathedrals of Constance and of Munich are true masterpieces of ironwork in fabrication and form. For example, one sees on t the muntins of wrought iron of the grille enclosing the tomb of Maximilian ornaments of wrought iron, that are even welded to the muntin itself and neither pinned nor riveted. We have had occasion, even in France, to mention this process in fabrication not entirely lost, frequently employed at the end of the 15 th and beginning of the 16 th centuries. These welds do not consist of a simple brazing with copper or brass. No metal but iron appears between the bar and the attached wrought iron. Although this was at most a thickness of 0.4 to 0.8 in., it adheres perfectly to the entire surface of the bar.

The fragment given here (Fig. 44) from the tomb of Maximilian explains this process. The welded leaves of sheet or wrought iron have evidently been hammered before the operation and made to adhere perfectly to the bar, since it would only have

been possible afterwards to chisel them, but not to give them the supple and soft medeling by repoussee work of the hammer.

SERRURERIE D'ASSEMBLAGES. Assembled Ironwork.

We have presented in this Article only pieces of ironwork, welded, cut or stamped, riveted in small parts, such as suitable to make for the ironwork of doors.

Yet there were made great pieces of assembled ironwork, such as grilles, enclosures, ironwork of wells, etc. Those works required the use of particular means to ensure their solidity. These were no longer merely welds or some pins, but combinations for assembling, that belong exclusively to ironwork. One will easily comprehend that men, who in all branches of architecture know how to adapt so well the forms of the material employed in the work, sought in great pieces of ironwork to admit only art compositions lending themselves to the requirements of working in iron. Then the connections, the needs of construction, appeared frankly instead of being concealed, and became the motives of decoration. The artisan further sought to give his work a visible reason of existence; he intended its organism to be understood, so to speak, that men should appreciate the efforts that he had made to ally intimately art to the necessities of construction, the qualities peculiar to the material employed. That those modes of procedure may not be to the taste of everyone, that they only strike those minds loving to find the imprint of reason in human works, that they oppress idle natures, we admit; but we are forced to recognize also that art is really introduced into industry only under control by true and clear principles, summed up in this:- subjection of the form to the need, to the use of the material and the properties peculiar to it.

We have so fully lost the habit of respect for these principles, that we remain surprised before works with forms required by reason, and that we take sincere experience as subtlety or a superfluous complication. Yet to conceal a connection, for example, that is more subtle and more complicated than if we left it visible; it is certainly less sincere; perhaps much less solid and more difficult in execution. To fasten together at right angles two square iron bars by tenon, mortise and pin, as one would do for carpentry or joinery, presents no external complication, since one sees nothing of the work of the artisan;

but that mode is suitable for wood, that cuts easily and has a grain, but is not justified if applied to bars of iron of m minimum size, very difficult to mortise and tenon; further, s such a connection is always defective because the tenon is v very small, and cannot hold enough to give to the connection great solidity. On the contrary, if two bars are assembled at a right angle as indicated by Fig. 45 at A, the horizontal bar with a prong B entering the fork made at the end of the vertical bar, the connection is very simple, broad and solid, very appropriate to the material. If this connection be made close by a keyed bolt detailed at C, a washer more or less rich being inserted between the head of the bolt and the fork, the decoration of the joint is entirely made, and in reality is o the only reasoned use of the most natural means required for the solidity of the work. When it is necessary to place intermediate vertical bars, the horizontal bar will have enlarged eyes D, through which those bars pass.

If we enter the true path, that indicated by the construction, the decoration of the work is made, so to speak. Assuming that the grille is to have a rich crown, the end of the horizontal bar, the fork of the vertical bar and the ends of the intermediate bars, furnish motives of ornamentation, that far from altering the principles of construction, only strengthen it. (Fig. 46). This example suffices to show the method followed by the artisans of the middle ages. In their trade they o only applied the methods adopted in the other branches of architecture of that epoch; to develop the form in the sense indicated by the need, reason, and the quality of the material. In fact we cannot too frequently repeat, the art of architecture is only possessed on these conditions.

When one examines the locksmith's works of the middle ages, he observes that the iron is smaller in comparison to that e employed today; that those works have an elegant and slender appearance. And in fact lightness is one of the qualities that ironwork must possess, since the material is very resistant in small sizes. Yet wrought iron, if it has a considerable strength in acting as a tie or bond, es flexible and not stiff, and vertically cannot support a heavy weight, without giving it a thickness little suited to that kind of work, and that increases the expense. Then by combinations in assembling the

locksmith can supplement the lack of stiffness of the metal. Iron resists a load according to the extension of its surfaces, (Fig. 47), and a bar A 1.18 ins. square and 6.6 ft. long, that when set vertically cannot support a weight of 2205 lbs. without bending, will retain it stiffness of equal weight and f forged according to the sections B. Placed horizontally it w will the the same; the iron bar well resist a load better, t the more its surfaces are extended; this principle has caused to be adopted in our modern structures the shapes termed T or I for floors, principals and purlins of roofs. Our smiths of the middle ages did not have the powerful rolls of the mills and tha rcol the iron into uniform shapes with flanges, supplementing these by combinations, often very ingenious, in o order to retain for their ironwork the proper lightness.

Their closing grilles, for example, are composed of panels grooved into verticals stiffened by reinforcements of flying buttresses very skilfully arranged. The vertical bars intended to support are hoisted and sometimes are even com osed of several rods. If a square bar supports a load it necessarily bends, not in the diagonal of the square but toward one side. Then by rotating the diagonal of the square about its centre, a a bar is produced that for its entire length and at all b parts has the resistance presented by that diagonal. That is why one so frequently finds in the ironwork of the middle ages twisted square bars, where the corners of the square section form spirals. Thus (Fig. 48) a bar of square section A being set vertically and loaded will bend toward one of its four f faces; but if by means of twisting, the diagonal swings through all points of the circle enclosing the square (see B), t the bar will resist a load no longer according to the resistance of the side of the square, but according to that of the diagonal; hence this being longer than the side, the resistance will be greater. With equal lengths, the twisted bar B w will further be heavier and contain more material than the simple bar A, since the angles of the bar are compelled to f form spirals. Yet to the eye the twisted bar will be lighter than the simple bar, because of the concave surfaces necessarily produced by the sides of the square rotating on its axis.

For the same reasons, the artisans of the middle ages often composed vertical supports of iron by means of two or three r

round rods twisted in a helix; thus increasing the means of r resistance without sensibly increasing the weight of the iron. These kinds of works required care, skill and a little thought, and it was found one day -- the guild of the trade having lost the strength that maintained among them workmanship at a high level -- and some architects having found it preferable, rather than constantly seek reasonable and novel forms -- to adopt a certain pretended classical taste, a sort of formulary applicable to all work and all materials,(which singularly simplified their work), have declared that all those researches, the result of experience, study and perfected fabrication, were only a product of caprice or of ignorance. It is unnecessary to state that this fashion of appreciating an entire side of architecture and industries connected with it, must be greatly prized by the numerous class of persons, that do not desire to give themselves too much trouble. Thus the ironwork of the middle ages was very badly regarded during these last centuries, and it is found to be in good taste to reproduce in iron (as may be seen in the court of May at Paris) the orders with their capitals, entablatures, stylobates, etc.; the whole fabricated in spite of the material and the means, that it imposes on those knowing its properties and pretending to utilize them.

In the assemblages of the ironwork of the middle ages, there is an inexhaustible subject for instruction. By reasons easily seen, it is preferred today to apply reasoning to matters relating to the art of architecture; at least those principles are professed by many artists. It is certain that in their e eyes those artisans of the middle ages, reasoning as they did, always taking the construction as the motive of the decoration, were in a bad path. Economical od the material, they attained the end by the truest means. Far from concealing those means, they exhibited and honored them. In fact when a means is simple and practical, there is no occasion to conceal it; on the contrary, if it be an expedient foreign to the nature of the material employed, that does no offer serious guarantees of stability, and requires the use of resources out of proportion to the result, one cannot conceal it too fully, a and that is what is habitually done on our fine building hardware.

We have just stated that the smiths of the middle ages had to fabricate grilles of a certain extent, and they proceeded by a series of panels let into bases. We do not know whether those artisans had observed and calculated the effects of the expansion of iron; it is no less certain that by the use of this method they avoided the inconveniences resulting from s setting in place long solid grilles. Then these being expanded by heat or contracted by cold caused continual movements, whose least danger is to break the fastenings, to bend the verticals out of line, to prevent the action of the edges of the opening portions, and weaken the connections. One could guard against these inconveniences by means of tenons, pins or bolts left slack, i.e., se to leave some play. But that could only be done at the expense of the stability of the work. On the contrary, the system of grilles set in panels left to the iron opportunity to expand, while retaining uniform stability,for the whole, whatever the temperature.

The principal verticals of the grilles then generally consist of a rectangular bar with two flats to form grooves in w which are inserted the panels. Therefore it is necessary that these verticals be maintained in their vertical planes in two directions by means of flying buttresses or anchored braces. Those necessary accessories, as always, supply a motive of d decoration.

Here (Fig. 49) is one of those types of verticals with grooves suited to receive the panels of the grille and with curved braces. At A is sketched the section of the vertical on a b. The middle c consists of two bars 1/2 by 1 in. leaving between them a space of 1/3 in. Two plates d are riveted to t this middle bar. The profile B shows that the flanges have t two reinforcements e forming mouldings, having edges below serving to abut the two braces D. At the height g these braces each divide into two branches (see the elevation at h), so t that these two braces have four anchors suited to prevent the overthrow of the vertical, either in the plane of the grille or perpendicular thereto. At k and l the braces and flanges are pierced by rectangular holes through which pass the double overlapping keys (detached at G), each pierced at front and rear ends to receive the keys H, by means of which the entire system is strongly held together. These keys being inserted,

their ends m are bent by the hammer. [1]

Note 1.p.3.6. These details are collected from several pieces of grilles of the end of the 14 th century. The braces o and keys have been drawn by us from the remains of grilles at Mechlin. As for the verticals with grooves to receive the panels of the grille, they are very frequently found in France, Belgium and Germany.

The ironwork of wells still present quite numerous examples of beautiful connections. If the curb of the well was against a wall, the pulley was suspended from a bracket fixed in tha t wall. One can still see one of those brackets with a pulley attached to the wall of a house of the 15 th century opposite the cathedral of Moulins (Fig. 50 at A). The bars forming the angle and quadrant are 1.34 × 1.61 ins. Those bars have edges chamfered by the hammer (see section b made on c d), and these chamfers stop at the connections . The cusps and the top ornament are riveted to the principal bars. To make the three c cusps in the triangle solid, two circles g hold their ends by rivets. The upper cusp h has its end curved in an eye to receive the rivet holding the double rosettes l of sheet iron. At the end of the horizontal bar is the reinforcement K, that receives a vertical rod, on the bent end of which is riveted a little roof m of sheet iron (n in plan) intended to cover the rope of the pulley at the point where it is in contact with the iron. This pulley turns on a bolt passing through i its centre. [1] One will note that the cusps and even the top ornament are not merely a simple decoration, but add to the resistance of the iron triangle by bracing its sides and forming above the horizontal bar a sort of little truss. Thus the smith could only employ bars of small dimensions relative to the length of the bracket and the weight it must sustain; now that bracket has been used for more than 400 years.

Note 1.p.359. M. Millet, architect of the cathedral of Moulins courteously drew this ironwork with the greatest care and communicated it to us.

At B is drawn a second bracket composed on a different system, but possessing at least as much rigidity as the first. The bars of the triangle have the section P, those inside with the section g. Into the groove made in these bars enter the p plate ornaments and stiffen the entire system. The bars of t

the triangle and interior are connected by tenons with little keys as shown by the detail s. This bracket swings in two eyes fixed in the wall. [2]

Note 2.p.359. This bracket was fixed on the carpentry above a little well. There still exists one nearly similar at Avignon; but the latter was intended to bear a torch (15 th century).

We cannot insist too strongly on this point; in the ironwork of the middle ages it is not sought to conceal the connections. At these connections the bars remain of full size or are enlarged, as we have shown in the example of Fig. 45. One carefully avoids reducing their strength where stressed.

Besides grilles arranged in panels entering the verticals, grilles were also made of assembled compartments, and this by simple and solid means. This grille (Fig. 51) furnishes an example of this sort of combinations. [3] It is a work of the 15 th century. It consists of verticals fixed in the pavement. Between these verticals reinforced at B are fixed the bars C, which have little tenons at each end. The upper part of the vertical ends in a strong pin riveted on the rail D. Circles are inscribed between the verticals, cross-bar and rail, and circumscribe the four quatrefoils. Semicircles fill the lower portion. At a, b and c are sketched the sections of the bar C, circles and quatrefoils. at d is represented the end of the cusps. Riveted pins e connect all these parts, whose hexagonal sections lend themselves to a perfect joint. This entirety D presents much strength, is easy to assemble, and requires no welds except at the ends of the cusps and to close the circles. The verticals are only 0.94 in. wide by 1.65 ins. deep.

Note 3.p.359. There exists a grille similar to this at Ghent (hall of arms). Another nearly similar was seen in the church of S. Denis before the restoration in 1818. (Drawings of Percier)

The ironwork of wells set on the curbs also presents combinations of ironwork interesting to study. In the courts of castles, monasteries, at the middle of cross-roads, one sees beautiful ironwork supporting pulleys of wells.

Unfortunately nearly all those works have been destroyed, and if they are still seen in place, this is because they have been forgotten. At Sens, Troyes, Semur and Beaune, in the court of the hospital Hotel-Dieu at Dijon, some remains of this ir-

ironwork exists today and date from the 15 th and 16 th centuries. Old engravings also show us the appearance of this ironwork of wells, but do not reproduce the connections; we are reduced then to cite a very small number of examples. The first that we give no longer exists and is known to us only by a d drawing of Garneray. [1] This piece of ironwork seems to date from the end of the 14 th century, and was found placed in the dependances of the castle of Marcoussis. The second is still seen at Troyes, and the third in the court of the hospital of Beaune; the two last belong to the 15 th century.

Note 1.p.361. This drawing is in our possession and indicates the connections, shown with care.

Fig. 52 reproduces the ironwork of the well of Marcoussis. That ironwork is composed of three bars of square iron with braces at the bottom to prevent swaying, i.e., the vibrating movement that might be made by the three bars. Those further are slightly inclined toward the centre. A circle of wrought iron unites them at the top, and further receives connecting cusps that give stiffness to the entire work and maintain the three verticals in their plane. From the circle above the bars rise three volutes held between double bars at the height a. At the middle of there three volutes passes the kingpost b, from which i suspended the pulley. The circle, the bars holding the volutes and the kingpost were ornamented by cut plates riveted on.

The ironwork of the well of Troyes is not in form as graceful as that of the well of Marcoussis, but its composition a and connections merit mention. The curb A (Fig. 53) is oval inside, and an irregular octagon externally. Three verticals are fixed in the curb itself so as to present in plan a triangle with unequal sides, an arrangement permitting three persons to draw water at the same time. Two persons place themselves at a and b, the third being at c. Three pullies are suspended to the ironwork by ceans of a sort of tie B to the kingpost, then the two horizontal bars passing through the eyes d, projected in d′ on the flan A. The three branches D suspend the k kingpost as in the preceding examples, and are held at the top of the three verticals by a kind of enlargement and a strong keyed bolt G. The verticals are composed of two round bars 0.3 in. each and twisted in helical form; a ring E decorates them

at about the middle. At the bottom where fixed in the curb, t these verticals are each accompanied by two eyes (see detail F) receiving eyes to which was attached the hook of the rope, when free from the bucket, for each person that came brought his own pail.

The ironwork of the well of the hospital of Beaune is perfectly preserved. It consists of three verticals, of a circle of wrought iron connecting them and a top with three straight branches, the whole decorated by cut plates. This ironwork is engraved in the work of MM. Verdier and Cattois,[1] and it does not seem necessary to reproduce it here.

Note 1.p.362. Architecture domestique. Vol. 1.

In ironwork the simplicity of the connections contributes much to the solidity. If the iron be worked too much with the hammer or chisel, it is made brittle and loses most of its st strength. It is then important to combine the connections of the ironwork while leaving to the iron all its strength. Just at the connections should the ironwork present its greatest resistance; not there should be the complex shapes to diminish its force. We have already presented in this Article a certain number of assembled works that show the care of the smiths of the middle ages to leave to the iron the greatest possible r resistance at the points of connection and junction; to avoid the weakenink caused by holes and bolts, or by passing one bar through another. In fact the holes are habitually swelled, the crossed bars are bent and not halved; the rivets themselves are placed in the widest parts and where the iron is purest. The file and our mechanical means, by which one cuts iron like wood, have caused the introduction into ironwork of a system of connections that too nearly approaches that of joinery. T This perhaps produces works of neater appearance but solidity is lost there, and our ironwork is easily dislocated by breaking at the connections. The question is always one of forging, and if the connections now made in ironwork are too frequently defective, this is because men prefer to resort to machines, rather than to fashion the iron with the hammer and men's arms.

It would take too long to give in this Article all the connections adopted by the smiths of the middle ages. We content ourselves with presenting some. Here (Fig. 54) are connections with swelled holes. The grille assembled wit tenons and pins

presents no solidity; it is further easy to remove the tenons from their mortises by driving out the pins with a punch. Example A presents the angle of a window grating projecting from the face of the wall, which is termed a "cabaust."[1] The angle bar passes through a hole a swelled diagonally, the rails b being forged in one piece with their returns. Example B gives a fragment of a railing; all bars pass through each other and must have been made with the swelled hole d, through which the rod e was passed and riveted. Bars f were slipped on the rail g, after which the swelled hole h was fashioned a each bar f. Then the ends of the bars c, c' were passed through the holes h; thus the bars f have taken their places between the sprays e. The bars c and f are passed through the swelled holes in t the bottom rail i; the ends of the bars c, c' are riveted on the washers K placed on the top rail; then to finish are placed the rings m, rolled up but no welded. The curve m with its swelled eye n forms a handle at each end of the railing and fills the office of an angle in stopping the swaying of the vertical bars. Impossible to separate such a grille without tearing out the anchors and cutting the rivets. Fig. C also presents a projecting grating or "cabaust." At p are the anchors into the wall. The clip g forms a corbel, is itself fixed and serves as a rest for the base v. The connections by swelled holes of this grille are too simple to require explanations. At D is an angle of an opening with its fork detailed at t.[1] There is still seen at Troyes a beautiful projecting grating of a window or shop, dating from the end of the 15 th century; we think it necessary to give some parts.

Note 1.p.364. From which is derived the word "cabaret." (Cobin). The shops where wine was sold at retail were closed by grilles projecting on the public street, from "cabausts," "cabarets." A few years since all shops of dealers in wine were fitted with bars in memory of that tradition.

Note 1.p.366. Example A comes from a grille of the castle of Tarascon (15 th century). Example B of a railing (renewed) d drawn by us at Poitiers in a store of old ironwork from the old palace of the counts (probably of the 14 th century). Example C from a grating drawn by us at Chartres in 1835 (15 th century).

This grating is 6.9 ft. high and consists of two projecting

bays. Three verticals, two at the corners and one at the middle, divide these bays, each composed of four divisions of s scrolled rods with flowers of hammered iron. Two verticals at the back are anchored to the walls by clips and support the entire system. Fig. 55 shows the bottom supports of the grille. The angle verticals A and those at B fixed on the wall are c connected by the corbel C. The bottom bar D passes behind the vertical A as shown at D' and A' on a rest a; and the scroll G bears a pin that passes through the two holes and is riveted outside on a washer and two rosettes of wrought iron. The scrolls are fastened to tn intermediate muntins or to each other by clips. Incised bands decorate the muntins and rails, both ts cover the joints and to give more body to the grille. The angle verticals are 0.87 in. (See at E the section of a bar with its covering of sheet iron. The rosettes F' are held to the scrolls by means of a rivet passing through the eye F. Each of the scrolls is then of one piece and without weld (see at H).

The arrangement of the corbels C is to be noted. This mode of strengthening the cust of the corbel, that supports the e entire load of the iron projection, by the end button and the four volutes, wants neither skill nor grace. It is further t the point of the weld and the two front and rear muntins A and B. The decoration is here again only the result of the p procedure of fabrication. French ironwork until the end of the 16 th century does not depart from this principle. It remains ironwork and does not seek to imitate forms belonging to other branches of the industry of building; one cannot say as much of Italian ironwork.

That after the 15 th century wanders from the forms that p properly belong to it,to reproduce in miniature the orders, entablatures, pilasters and architectural members, that are the work of masonry. Thus men thought to return to anticuity; : while among among the Greeks as well as among the Romans, metal articles took forms appropriate to the material.

In our turn, when we pretend to return tc antiquity by bassing ourselves on the false interpretations due to Italian artists during the Renaissance, we only perpetuate these errors, to which one scarcely seeks to turn today.

On the other side of the Rhine were fabricated marvellous

articles in ironwork during the 15 th and 16 th centuries. The grilles of the tomb of Maximilian at Innsbruck, those of the cathedrals of Constance, Munich and Augsburg, which date from the 16 th centery are real masterpieces, and merit representation and a special publication. Yet it must be recognized t that in that ironwork is a certain exaggeration of forms, a research from which men abstained in France during the middle ages and even during the Renaissance. The fine ironwork of the chateaus of Gaillon and Ecouen, some fragments of which are preserved; the door of wrought and repoussee iron of the gallery of Apollo at the Louvre is a work of the greatest worth, and shows us that modern industry in that respect but exceptionally attains this perfection, in spite of the extent o i its means.

SIEGE. Siege.

When Gaul was conquered by Rome, it remained at peace for nearly three centuries. The Gaulish peoples were enrolled in the Roman legions and went to make war in Spain, Africa, Illyria and Asia Minor; but from the reign of Nero until the last emperors of the West, their country enjoyed the most complete tranquillity. Who thought then to fortify the cities, that no known enemy could attack? Even Germany, so long menacing, and whose hordes had penetrated to the centre of Gaul at several times, was allied with Rome and furnished it with soldiers. Britain had been subjected to the imperial yoke but imperfectly, but did not think of taking the offensive. Spain was as R Roman as Italy. Calm, devoted to commerce, agriculture and industry, furnishing Rome with its best legions, far removed e even from the palace intrigues, which under the emperors still stained Italy with blood, Gaul could believe in eternal peace. So the stupefaction was great, when were seen to appear suddenly in the northeast the heads of columns of barbarians. Defense was nowhere prepared. For a long time the ancient cities had extended outside their ancient walls or had destroyed them; the fortified camps established by Cesar and maintained by the first emperors were abandoned, effeced by civilization, cities and marke towns. After this first wave of barbarians, that p passed like a waterspout without finding obstacles, and that returned from whence it came, loaded with booty, the Gaulish

cities were terrified and demolished the monuments farthest from the centre of the city, and hastened to erect with their fragments walls with towers. The empire was then in dissolution, and those works of municipalities could not be made at the same time on a general plan. Each one enclosed itself as it could, and when new invasions of barbarians occurred, those defenses only irritated those unknown conquerors, without being able to oppose serious obstacles. Further, to defend a city, what are ramparts, if behind them are not found experienced troops, good engineers, skilful and cool captains, supplies of all kinds, and if the defenders do not have habits of order and discipline? One then cannot say that the Gaulish cities, fortified in haste in the 5 th century, were besieged, since they could not find themselves in the most ordinary conditions of defense. They were invested, taken by assault after useless resistance and sacked. Those hordes of Huns, Visigoths and Vandals neither had nor could have in attacking strong places any tactics other than audacity, contempt of danger, fury that c clears obstacles without taking account of the life of the s soldier.

The very advanced art of the Roman engineer, both for the defense and for the attack of places was lost in the West and could only reappear after long periods of wars and disasters.

The sieges undertaken by the Merovingians (so far as the te texts allow us to appriciate them) consist only in enclosures of little importance and in repeated assaults. If the cities resist very little, discouragement and sickness soon reduced to naught the troops of the besiegers. Yet the barbarians themselves had borrowed from the Romans or orientals some of their means of attack. Gregory of Tours,[1] speaks of battering rams that Attila employed to batter the walls of Orleans. Aetius, as well known, forced him to raise that siege; but in those times intermediate between the Roman rule and the feudal establishment in France, there is no question of regular works of investment, of mines systematically laid out, of those machines that the eastern empire borrowed from the Greeks, of those trenches for passage, nor of those platforms, that the i imperial troops knew so well how to erect opposite the ramparts of a strong place. When the Normans made an invasion into the North and West of Gaul under the Carlovingians, then found

before them only cities palisaded in haste, woodan forts, defenses in ruin or badly laid out. They besieged those scarcely enclosed places, took them easily, carried their booty on board their boats, into the intrenched camps established on the coasts near the mouths of rivers or on islands. It is not doubtful that those Scandinavian peoples, regarded as barbarians by western chroniclers, from a military point of view were far more advanced, than were the Gauls. They knew how to fortify, to protect themselves, to supply and equip their winter camps; and in that they showed well their Ahyan origin; the Aryans having left everywhere along their passage the traces of those defensive works, those forts with well chosen sites. Now whoever knows how to defend himself, knows how to attack; the defense of a place being nothing else than the foresight of the means that will be employed by the attack.

Note 1.p.369. Gregory of Tours. Book II. Chapter 7.

There remain to us but very few defenses that date from the epoch of the first establishment of the Normans on the soil of Gaul;[1] but in the countries invaded and occupied by those adventurers, the art of fortification developing more rapidly and on principles more intelligent than elsewhere in France, one can suppose that those terrible Normans had brought with them elements of military art of a certain relative value. All historical evidence shows us them infuriated at the attack on strong places, while Gaulish troops were very quickly repulsed by the difficulties of a siege. Men accustomed to naval construction and to all the labors required by navigation in vessels of very small tonnage, acquire a skill and quickness in maneuvers, that make them apt in the labors of sieges. Even today our sailors are the quickest and most adroit men that can be found, if it be necessary to build a parapet, to palisade it and equip it with artillery, because they have acquired and retained that habit of combining instantly their strength for a special object. Later when William the Bastard made his descent on England, one cannot mistake the relative superiority of his troops, to build, supply and launch a fleet, to make a rapid invasion, and when England was partly subjected, to erect castles and defenses suited to dominate the peoples of the cities and country. Of all conquests made since the Roman empire, none succeeded better than those of the Nor-

Normans. From the day when they set foot in the Saxon island, they only extended and gradually fortified themselves, without receding a step. The same fact appears in Calabria and Sicily. Now results so general and so rare are not the effect of chance, but must depend on a relatively strong and regular m military organization, on an art already developed, and especially on a habit of discipline than on an exceptional fact in her armies. Discipline is never more necessary in armies, than when the siege or defense of a place is concerned; thus during the 10 th and 11 th centuries the Normans took a prodigious number of fortresses; they knew how to defend them in a manner to discourage very frequently the besieging troops. One can conclude that independently of their valor, the Norman armies were strong through discipline, by the habit of the regularity of the work; hence they were the first at the beginning of the middle ages, who attacked places with a certain system.

Note 1.p.370. Those defenses are only intrenched camps, lines suited to protect a promontory or shore from attacks coming from the interior of the country.

The primitive feudal system was still incomplete, lent itself marvellously to the scattered defense, but was unsuited for the practice of the art of attacking places. In fact the troops of fighting men collected by the feudal lords could have but a limited service, forty days on an average; with those armed bodies one could only undertake transient expeditions or surprises, and that explains why feudalism believed itself invincible in its castles from the 11 th century. Armies were necessary to attack and take those places. There are no armies where there are no people; then neither the fact n nor the word existed. The kings of France themselves, so far as this name can be given to the chiefs, who in the territory of Gaul were recognized as sovereigns by yumerous vassals, fr from the Carlovingians to Philip August, had no permanent armies and could undertake no long sieges. All questions of war are never decided in a definite manner, and the expedition c commenced under the most favorable auspices was soon reduced to nothing by the desertion of the great vassals, who could o only retain for a certain time the men led by them under their banners.

Among other considerable results, the crusades were certainly the first point of support of the French monarchy for reducing feudalism under its domination. In Syria was acquired t the habit of a long war; the relations with Byzantium placed the western armies in possession of the means of attack employed by the Roman armies. Thus after the return from those expeditions, even if they were unfortunate, we see in the West the art of sieges practised by the sovereigns assume consistency, and attack feudalism to reduce it gradually, castle by castle, from Philip August until Louis XI.

Dating from the first crusades the attack of strong places was made according to certain rules and systematically; but at the same time the art of fortification developed, and attained in France an ex.raordinary perfection.

If one compares our fortifications of the end of the 12 th and beginning of the 13 th centuries with those built in the same epoch in Italy, Germany and England, he cannot mistake t the superiority of the French fortifications. That superiority of the defense was only the result of the superiority of the attack. In fact the bulk of the armies of the crusaders was then chiefly composed of Frenchmen, i.e., of contingents furnished by Brabant, Flanders, Ise-de-France, Picardy, Normandy, Anjou, Poitou, Berry, Guienne, Auvergne, Burgundy, Lyonnais, Provence, Languedoc, and Champagne. These armies of crusaders on their return were employed in serious and long wars, in difficult sieges. Those are the troops of Philip August, of Simon de Montfort, and later of S. Louis.

In Syria, those armies employed Lombard, Genoese and Greek engineers, who had retained and even perfected the traditions of the Roman armies. Soon by reason of tha faculty peculiar to the peoples of our country, we appropriated to ourselves the methods of those auxiliaries, too frequently hostile; we return to France and we employ these methods against our enemies. Now enemies feudal country are, or can be everywhere. Today they will be Albigenses, tomorrow the great vassals leagued against the royal power. Everywhere arose formidable fortresses; they are no sooner erected, than they are attacked, taken, retaken, enlarged and perfected. Thus is formed a real art, with which it is true that men are little occupied, but which no less has had a consiberable influence on the character

and manners of a nation.

We shall say at once, that under the Merovingians and even until the last of the Carlovingians, the art of war was very limited, and did not go so far as to know how to attack or defend a place, and that if the hordes of barbarians so easily invaded the soil of Gaul during the 5 th and 6 th centuries, that resulted from the long peace enjoyed under the empire of the Cesars, and the neglect of the municipalities, who neither had ramparts around their cities nor cared to equip and g guard them. The Gauls had lost the habit of war. In the 12 th century it was no longer so; for 600 years men had not ceased to fight on the western soil of Europe. Feudalism was installed in all its power, and with it war was a permanent condition. The old Gaulish spirit, so well described by Cesar, was reanimated in the midst of the perpetual struggles of the first times of the middle ages, and however oppressive was feudalism, it found in this temperament of the country elements of power, that it exploited against itself.

On a territory covered by fortified castles occupied by turbulent and daring nobles, war was and must be in a chronic s state. Besides, he that possesses arms does not await occasion to use it and provokes it if necessary. Likewise he that p possesses a fortress does not live without a desire to see it attacked, were this only to prove its strength. In such conditions, the art of sieges could not fail to develop equal to that of defense, and the lords returned from Syria, where they had acquired new knowledge of that art, and must seize with enthusiasm all occasions to use this against their rivals. But to besiege a place it was not sufficient to have good troops of armed men, but there were required soldiers, miners, pioneers, and constructors of earthworks. Thus gradually that part of the people, which seemed to be excluded from the profession of arms, found itself engaged to take its part, at fi first laborers and levies, then later as a body of troops.

We shall speak but briefly of sieges undertaken against places before the 12 th century, because the few written documents remaining to us on those operations are too vague and even too contradictory, for it to be possible to deduce from them something resembling an art. There is scarcely a question in these documents that the means were analogous to those employed

by the Romans, but with little system. At the siege of Angers against the Normans, Charles the Bald employed machines erected by engineers brought from Byzantium; [1] but those means having produced no effect, there was only a need for the besieged to divert Mayeuse. The Franks employed from the early time rams to batter and sap the walls of strong places, and wagons covered by hurdles and planks. [2]

Note 1.p.373. Chronicon monostery S. Serg. Andegor.

Note 2.p.373. Hist. Franc. Greg. of Tours. Book VII.

The Visigoths, most civilized among the barbarians, fortified and attacked places according to the Roman or Byzantine method.

The western armies that invaded Syria at the end of the 11 th century, properly speaking, were only composed of knights and nobles accompanied by men-at-arms under their banners, and an undisciplined multitude without experience of war and scarcely armed, by women and children, monks and merchants, all persons more or less embarrassing than useful, who had followed Peter the Hermit. Three fourths of this people of emigrants rather than soldiers were dead of misery bedore the first serious enterprise of the western men, which was the siege of Nicea.

On May 15 th the place was invested by a first division of the army of the crusaders. The city of Nicea is partly protected by a lake that washes its walls. Then in 1096 Nicea was surrounded by thick walls flanked by towers near each other. The crusaders approached the city from the north, arranged their camps in a semicircle by quarters, for those first crusaders obeyed chiefs independent of each other, who held a council for all important operations. The combined army, according to the statement of William numbered 600,000 infantry of both sexes and 100,000 men-at-arms. The first operations of the siege were limited to preventing the inhabitants from going outside the walls and from receiving provisions or reinforcements; but the lake bordering a part of the city was an open way to the exterior; the army of the crusaders had no b boats to prevent the introduction of aid by that way, and could not think of guarding the entire extent of the shores of the lake, so that the siege long continued, due to the goodness of the walls. An attempt was made by Soliman to disperse

the besieging army; but the Asian troops having been repulsed, the Frank princes pressed the ramparts more closely, established casting machines and delivered several assaults, but without success. Among other machines, they built against the r rampart a cat composed of great timbers, to permit twenty men to sap its base. This gallery was destroyed by projectiles of the besieged and the miners were crushed. Fatigued by so many useless efforts, the princes resolved to send a considerable number of men to the seashore to take apart vessels, load them on wagons and to bring them to Nicea. This operation succeeded perfectly, and the lake was soon covered by the vessels of the Christian fleet, each able to carry 50 to 100 men. Thus the city was really invested and could no longer receive supplies. Yet the besiegers redoubled their activity, increased the number of their machines, brought up to the ramparts battering rams covered by sheds, sapping the walls. The besieged did not remain idle, but filled with masonry at night the holes, that the miners succeeded in opening at the base of the walls. Discouragement began to possess the army of the crusaders, when a Lombard belonging to the expedition proposed to the princes gathered in council according to custom, to overthrow one of the strongest towers, if he were supplied with the necessary funds. In fact, money and materials were given to him; he built a powerful machine suitable to be applied against the walls and protected from projectiles. "Aided by his workmen," says William of Tyre, [1]"the inventor first guided his machine into the ditchs, and having crossed them, he applied it to t the rampart with as much facility as skill. Yet the besieged acting with their customary activity, cast immense stones and combustibles of all sorts, that could not adhere and continually slid off the very steep roof of the shed; they began to despair of success, and at the same time admired the power of the machine and the skill of the constructor. Men concealed beneath that movable shed, sheltered from all attacks of their enemies, labored constantly and with the greatest ardor in demolishing the masonry, so as to overthrow the tower. As they removed the stones they set timbers in their places, fearing that the shaking caused at the base would cause the upper part to fall on the machine and crush it. After having removed enough masonry to cause the tower to fall, the miners set fire

to the props and placed combustibles between them. Then they retired to the camp and abandoned the machine. About midnight, all the inserted props having been consumed, the tower fell with a crash."

Note 1.p.374. Histoire des croisades. Book III.

The breach being made thus, the city fell into the power of the crusaders. Some facts are to be noted in this story. It was a Lombard, i.e., one of those north Italians, who then k knew so well how to profit by the arts and science of Byzantium, that undertook the construction of the mine gallery of carpentry. The art of the engineer was thus devoted to the undertaking, which we snall long see. This gallery is so combined, that the slopes of its roof are sufficiently inclined to throw off projectiles. Men employ wooden struts as did the Romans, to maintain in equilibrium the upper parts of the mined walls until the moment of setting fire and consuming the props, allowing the structure to fall.

It is evident that this army of western princes, three fourths composed of a multitude without consistency or discipline, full of women and children, was not made to conduct a siege with success, order and method. In the tale of William of Tyre is seen no fixed plan, it is a succession of expedients. B But these armies or rather a multitude of emigrants could not delay in learing the art of a tacking places from very hard experience. The siege of Antioch already showed a sensible advance, one not accomplished without checks.

The army crossing Bithyni and Galatia during the month of July, 1097, saw perish the greater part of its beasts of burden and its war horses. Many of those unarmed pilgrims, and those women that followed the bulk of the troops, remained on the road and died of misery and sickness.

The crusaders did not present themselves before Antioch before the approach of winter. The council of princes decided h however, that the siege before the place should be commenced without delay. The army then numbered more than 300,000 men aple to bear arms, without counting the floating masses that followed it, in the midst of which were many women and children. Yet however numerous it was, that army could not completely invest the place. "It dug a ditch between itself and the city,"says Kemal-Eddin, [1] "its design was to protect itself

from the attacks of the garrison, which made frequent sorties."
William of Tyre does not mention that enclosing line, but he says that the crusaders on arriving, cut all the trees of the forests near the city to build barriers around the camp and posts for fastening their horses.

Note 1.p.375. Author of history of Aleppo. (See Extraits des historiens arabes relatifs aux guerres des croisades. Reinaud. Section 1).

Antioch was still at that epoch a populous and well fortified city. Built on the left bank of the Orontes, its ramparts were pierced by several gates; some, five in number opened on the plain opposite the course of the river; the others were t three in number on its banks. One of those gates down stream at the west opened on a stone bridge crossing the river; that situated upstream and named gate of the Dog had before it a causeway on masonry arches crossing a marsh. From the middle gate called gate of the duke to the lower gate of the bridge the river washed the ramparts. The investment could then extend only on the eastern, southern and western sides with but a part of the northern side. The inhabitants were masters of the bridge, and the crusaders at the beginning of the siege had not made any establishment on the right bank. The entire camp by divisions followed the principal chiefs: Bohemond; Robert, count of Normandy; Hugues the Great; Raymond, count of Toulouse; Godefroy, Baldwin, Renaud, Conon de Montaigne, etc., occupied only the left bank. During the first operations of the siege, the soldiers of the army of the crusaders frequently crossed the river by swimming to forage on the right bank, more fertile than the left; the besieged did not allow such occasions to pass without a sortie through the gate of the bridge and carrying off those parties. Thus the princes resolved to establish a wooden bridge across the river. They took all boats that could be found on the river or on the lake above the city; these were connected by beams and on this carpentry was laid a floor of willow hurdles. This b bridge of boats was thrown across at 1000 ft. (?) above the stone bridge and came to the gate of the city. The quarter of the besiegers that guarded the bridge of boats and which closed the place from the bridge of the dog and the bridge of the duke, was constantly exposed to the attacks of the besieged

who extended on the causeway of the marsh, and thus found themselves in a bad position with the river at their backs, and having at their backs two exits by which the besieged could attack them. They first attempted to destroy the s one bridge but co could not succeed. Then was established a wooden tower, that was rolled before that bridge to command it; but the men of t the city succeeded in burning it. They built three stone-throwers, that cast stones against the gate of the bridge. But when these machines ceased to work, the inhabitants at once made sorties and caused losses to the army. The princes then adopted the method of barricading that stone bridge with stones and trees. The last means succeeded in part; and on this side the besieged no longer attempted such frequent sorties. In fact, the crusaders were as much besieged as the besieged, having to defend themselves daily against the sorties of the men of Antioch, who attacked their works, destroyed their machines and their palisades. Time passed, forage and provisions became scarce, and sickness decimated the armies of the crusaders. These on arriving before Antioch still had 70,000 horses, but had no more than 2,000 at most, three months after the investment. The rainy season made the roads impassable; men were in the water all day, and the saturated soil nowhere offered a refuge from dampness. This critical situation was even aggravated by the attack of a considerable number of troops from Aleppo, Cesarea, Damascus, Emesa and Hierapolis, to which were added the Arab nomads. The crusaders by a skilful maneuvre marched against that army, allowed it no time for communication with the city, vanquished it and killed 2,000 men, bu burned its camp at Harenc, and took 1000 horses, which were much needed. Returning the next morning before Antioch, 200 heads of Turks slain in the battle were thrown into the city. But these labors and attacks from outside and by the besieged, were an instruction for the chiefs of the crusaders. After t the affair of Harenc, the princes decided to establish an intrenched camp on the height situated a the east and above t the city. Later, after a vigorous sortie of the besieged, that put the army of the crusaders in danger, a fort was built opposite the stone bridge to intercep all communication of the inhabitants with the right bank. This work was made of stone from the tombs of a Turkish cemetery, end a deep ditch protected

it. Five hundred men were posted there. The men of Antioch co could no longer make sorties except by the most western gate, placed between the foot of the precipice and the river. Tancred established a second fort on the hill opposite that gate so as to command it completely. On this point William of Tyre mentions a curious fact. Tancred was elected by his companions to direct that work, a construction dangerous and difficult on account of the nearness of the ramparts. But that chief excused himself alleging the insufficiency of his private fortune. The count of Toulouse then gave him 100 marks of silver, and so that the workenm employed on that structure could receive a proper wage, there was allowed 40 marks per month from the public treasury. Thus the works of the siege were offered to the most worthy by election from the chiefs. The director elected persnally had to bear the expenses, probably for obtaining materials, transportation, and that mass of pilgrims that encumbered the army, which William of Tyre calls the people, were only workmen to whom were given wages. That army w which traversed all Asia Minor, followed by a multitude, thus had with it carpenters, masons, blacksmiths, tanners, tailors, armorers, "muchiers", etc., whose services were paid. It is then not surprising, that among these men who returned to the West after a very long sojourn in the Orient, they brought b back the influences of the Asian arts.

Yet Antioch was only taken by the treason of one of its inhabitants.

It was not the same at Jerusalem; but the army of the crusaders acquired in experience and discipline, what it lost in number.

On June 7 th, 1099, the western army camped before the holy city. It was not sufficiently numerous to invest it entirely, and was contented to place its quarters on the north and northwest sides, from the gate of S. Stephen that faces the east near Mt. Moriah, to the gate of Jaffa, which is pierced near the tower of David; for the place was not to be attacked from the side of the valley of Kidron. Also on this north-northwest front Titus directed his attacks. A little after the arrival of the crusaders, the count of Toulouse, who commanded the attack opposite the tower of David, moved part of his camp t toward the southwest, to the point where Mt. Zion extends to

the north of the ramparts and where was erected the church of Zion. The army of the crusaders thus occupied a little over half the perimeter of the city, but the besieged were in communication wit the country by the gate of Zion, opposite the south and by the posterns opening in the valley of Kidron.

Five days after their arrival, the crusaders attempted a first attack, and obtained possession of the outer works.

Today the vicinity of Jerusalem is completely deprived of tall forest trees; then the crusaders could find but a small number; yet the army was employed to cut and haul all the large or small logs that could be found, both for building towers and machines as well as for plaiting hurdles.

Laborers that had no personal resources received a wage taken from the common treasury, for the count of Toulouse alone still possessed sufficient money to employ men at his own cost.

The heat and lack of water caused most of the beasts of burden to perish; their carcasses were stripped to use the skins for covering the machines and portable towers. The besieged lost no time and having seized timber, ropes, iron, steel and tools, they labored without relaxation in making stone-throwers, installing defensive galleries and arranginm beams on t the ramparts.

In the meantime Genoese vessels anchored in the port of Joppa, bringing materials, timbers, iron and skilful workmen. This assistance arrived in good time. Lord Gaston de Bearn was chosen to direct the works of attack from the north. "At noon,[1] the army of the coun of Toulouse and all those serving under his orders exhibited no less enthusiasm in following the general impulse. They were even more animated for the work, as the count was richer than the others and had recently received new reinforcements, both in men and in supplies of all articles that he could need. The men brought by the fleet had come to join the troops that formed his camp, and had brought him all the materials or tools necessary for the structures that he was to build. In fact, they had ropes, hammers and m many other iron tools, further excellent workmen had also come, and had great experience in all the work of construction of machines, and they rendered great service to the crusaders by teaching them the quickest methods. The Genoese that had landed at Joppa were commanded by a noble, nicknamed the drunkard,

who had much skill in all works of art."

Note 1.p.378. William of Tyre. Book VIII.

It is easy to recognize by the statements of William of Tyre and of the Arab authors, that at that epoch, i.e., three years after its arrival in the Orient, the army of the crusaders had made rapid progress in the art of sieges. Orders are precise, the councils were more quickly followed by the execution; each man is employed; supplies came regularly, and instead of being wasted, as always seen in undisciplined armies, they are employed with order and promptness.

They do not lose men uselessly in attempting assaults before all means of attack are ready. It is here no longer a question of those acts of thoughtless bravery, that endanger the lives of the soldiers without any appearance of a serious result. All that army devoted itself to assiduous labor for six weeks, and the only actions mentioned are skirmishes between the foragers and troops making sorties from the city.

The eve of the day fixed for the attack, the duke of Lorraine and the two counts of Normandy and of Flanders, who had t their quarters at the north and northwest, made a reconnaissance and ascertained, that at the point least defended by nature, the besieged had strongly reinforced their defenses during the preparations of the crusaders. Like true captains, those chiefs immediately changed their plan of attack; during the night they caused to be dismounted the machines and the tower already erected, and had them transferred and rebuilt opposite the front, which at the east extends between the g gate of S. Stephen and the tower of the north angle, before the part of the city built on Mt. Bezetha at the left of the enclosure of the temple. At sunrise the besieged were amazed to no longer find neither assailants nor a machine around the gate of Damascus, and to see the tower and machines erected at more than 500 paces from the point where they had seen them the previous evening. Opposite on Mt. Zion the count of Toulouse had built a tower against the ramparts. A third attack w was prepared against the western projection. Thus the city was attacked at once at three points distant from each other by 1000 to 1200 paces. Scarcely had the day appeared, than the t three divisions of the army of crusaders moved at once, caused the towers to approach the walls and plied the stone-throwers.

the entire day was employed by the assailants in filling the ditches, in pushing forward the towers, and covering the battlements with projectiles, in causing the battering rams to a act against the ramparts: on the part of the besieged in covering the walls with mattresses and beams to prevent the effect of projectiles, casting incendiary materials on the machines and towers, repairing the merlons, in working their casting machines. The night put an end to the combat, and both sides guarded themselves with greater care, since at some points t the towers nearly touched the parapets, and the sentinels could fight hand to hand.

At the break of day the attack recommenced at the three points with more fury and method.

The towers are forced forward, the bridges are dropped and shored with beams torn from the besieged. The assaulting column of the north attack first penetrates on the ramparts, and hastens to open the gates to the bulk of the army. On his side, the attack of the count of Toulouse succeeded, and his troops extended through the quarter built on Mt. Zion. The city is g gained: the siege had lasted 38 days.

One sees that in these attacks on places, of which we have just given a brief description, the besiegers drew no regular lines of inner and outer enclosures; at the siege of Antioch, they limited themselves to planting palisades and to fortifying some parts. At the siege of Jerusalem, all their efforts tended to the completion of the machines and towers; they neither made trenches nor mining galleries. The soil surrounding the holy city scarcely lends itself, it is true, to these kinds of works. Yet the Romans commanded by Titus erected long ramparts at the north and west, whose places are still recognized, and that perhaps served the crusaders.

At the siege of Tyre, commenced on Feb. 15, 1124, the army of the western Christians caused to be excavated an enclosing ditch to be protected from outside attacks and to ensure the investment of the place. It attacked the defenses with many machines and with the aid of wooden towers whose heights exceeded that of the ramparts. Yet the besieged possessed stone-throwers superior to those of the assailants. "These,[1] recognizing that they had among them no man able to properly direct the machines, and that had full knowledge of the art of

casting stones, demanded from Antioch a certain Armenian named Havedio, a man with a great reputation for skill; his ability in working machines and in causing the blocks of stone to fly through the air was such as stated, that he hit and broke with no difficulty all obstacles designated to him. In fact he came to the army, and as soon as he was there, he was assigned from the public treasury an honorable salary, that could give him the means of living with magnificence according to his custom; then he applied himself actively to the work for which he had been summoned, and displayed so much talent, that the besieged must soon believe that a new war had been commenced against them, and they had to suffer misfortunes much more cruel."

Note 1.p.320. William of Tyre. Book XIII.

Not only did the western men profit thus during the first p period of the war in Syria, by knowledge possessed by the Greeks, but they brought greater study into the art of fortifying places. Those cities, such as Antioch, Cesarea, Edessa and Tyre, possessed ancient walls, extended at the end of the late empire, that were very well designed; their flankings were qu quite close, the height of the towers, the fine masonry of the ramparts, were a subject of admiration for the western men. They did not delay en imitating the excellency of these models. During that hard war of the beginning of the 12 th century in Syria, the crusaders were imprudent in the field, not yet possessing a tactics that could permit them to acjuire a marked superiority over the troops of the caliphs, even frequently beaten, but knew how to conduct with success a great number of long and difficult sieges. This was because necessity is a severe master; that before strong places well equipped, it was necessary to proceed with order, to acquire habits of work and discipline, that bravery alone could not replace; that it was essential to guard themselves well; to think of supplies of all kinds; to possess that superior quality of the soldier, tenacious patience; that were required coolness and regularity in the work. Thus when the remains of this army returned to t the West, what a change in its ways, in the fashion of conducting military operations! The troops of Philip August are no longer those armed hordes of the 11 th century, they are actual organized bodies, already proceeding regularly, and skilful in the art of besieging the strongest places. If Philip

August attacked and took so great a number of cities and castles; if he could first be regarded as the king of the French, possessing an authority not contested, was not in great part this predominance due to that military instruction of the armies of the crusaders in Syria? [1] The troops of the terrible Simon de Montfort were in part composed of chevaliers and soldiers who had made the war in Syria.

Note 1.p.381. See the description of one of the longest and most difficult sieges undertoken by Philip August in Art. Choteou).

On the siege of Toulouse undertakin by the count, there remains to us a precious document written in Provencal verse by a contemporaneous poet and eyewitness, as it appears. [2]

Note 2.p.381. Hist. de lo croisode contre les Albigeois. C Coll. des docs. Ined. de lo hist. de France, pub. by the core of the minister of pub. instruction. Paris 1837.

Simon de Montfort, forced to raise the siege of Beaucaire after having lost before that city his equipment, horses, Arab mules and machines, directed himself toward Toulouse, full of wrath and desire of vengeance. He called all the men of Toulousaine, Carcassez, Razes and Lauragnais, by ordering them to join him. Arrived before the city as an enemy, rather than as a lord returning home, the men of Toulouse begged him to leave outside the walls that warlike train, and to be willing to e enter the city with his men in ordinary costume and on palfreys. "Barons," replied the count, "whether it pleases or displeases you, armed or without arms, standing or lying, I shall enter the city and shall know what is done there. This time you have provoked me wrongly; you have taken Beaucaire from me, that I have been unable to retake, also Venaissin, Provence and Valentinois. More than twenty messages have announced to me that you are bound by oath against me; but by the true cross on which Jesus Christ was placed, I will not remove my hauberk nor my Pavian helmet, until I have chosen hostages among the flower of the city."

The men of Toulouse swore that they had never acted as enemies. -- "Barons," said the count, "there is too much at a t time of your offers and of your reasons."

In spite of advice and the most prudent observations, the count claimed that the city of Toulouse must recompense his

troops for the losses suffered before Beaucaire. "We shall return into Provence when we are rich enough, but we shall destroy Toulouse so that we shall leave there not the least thing either beautiful or good." "Since those of Toulouse have not betrayed us," replied Don Guy, "you should not condemn them, except by trial." The bishop intervenes, and pledges the men of Toulouse to go out peacefully before the count; the abbot of S. Sernin holds the same language to the citizens and chevaliers of the city. In fact they are disposed to receive the lion of a count within the walls. "But through the entire city spreads clamor, talk and threats; barons, why do you not return gently, by stealth (to your houses)? The count desires you to deliver to him hostages, he has demanded them, and if he fends you there outside, he will treat you as rascals." T They returned in fact; but while they go through the city to agree, the men of the count, squires and women break into the coffers and take what they find there. "At this sight, indignation takes possession of the inhabitants. Suddenly, while t the men of the count enter the houses and break the locks, a clamor rises in the heart of the city. "To arms, barons! Now is the time!" All then run into the streets and gather in groups; chevaliers, citizens, servants, women and old men, all take the arms nearest at hand; before each house rises a barricade; furniture, stakes, casks, beams and stones. "Montfort!" cry the French and Burgundians. "Toulouse! Beaucaire! Avignon!" Reply those of the city. The combat is bloody; the troops of count Guy beat a retreat, and seek to rally under a storm of bricks, stones and stakes. With great difficulty they succeed in forcing a passage through the barricades that rise at every moment. "Set fire everywhere!" cries the count of Montfort, when he despairs of maintaining himself in the insurgent city. S. Ramezy, Joux-Aigues, place S. Esteve, are in flames. The French have taken refuge in the church, on the tower of Mascaron, in the palace of the bishop, and in the palace of count Comminges. But the people of Toulouse erect barriers, dig ditches and attack these posts. Between the fire and the enraged people, the troops of the count form in column to act; repulsed, they retreat toward gate Sardane; still impossible on that side to pierce the multitude of assailants. The count retires to castle Narbonais in the night, having lost manw men and full

of wrath and anxiety.

However on the next day the anhabitants were taken in the snare spread for them by the bishop and the abbot of S.Sernin. The capitaulated, delivered the hostages, and the count gave up the city to pillage and almost entirely destroyed it.

Soon the young count Raymond repaired to the scene, and at night returned into his city. The people are all full of joy to receive their legitimate lord, and massacred the French posts. But there were no longer at Toulouse a tower, defensive galleries, walls, bays, gates, barriers nor arms. The F French take refuge in castle Narbonais, which they dare not leave, so formidabel are the men of the city. The countess de Montfort is shut up in the castle wit her son, for the c count is fightiug in Provence. She sends a messenger to him; if he delays to come, he will lose at the same time Toulouse, his wife and son.

The men of Toulouse occupy the city; erect ba riers, build lists and traverses, defensive galleries with slots, well protected oblique passages. All citizens, peasants, servants, w women, girls and children, labor hard to fortify the city, digging ditches, building palisades and bays. Torches light the laborers at night. Towers and churches are furnished with battlements. The count appoints officials to govern the city.

Guy de Montfort, brother of count Simon, soon arrives with a numerous troop. He presents himself in the valley of Montolieu, where the old walls have been razed. "Dismount, French chevaliers!" he criesto his men. Immediately abandoning their horses and crossing their lances, the chevaliers attack the men of Toulouse; they penetrate to the middle of the city. B But assailed on all sides, overwhelmed by tiles thrown on their heads, embarrassed in the barricades, lost and scattered, the men-at-arms of Guy, having lost a good number of their m men, retire to the garden of S. Jacques, after abandoning their baggage.

From all sides arise reinforcements for Toulouse. Count Raymond exhorts his barons to fatigues, privations, labors, watch and common tasks."

Before the garrison shut up in castle Narbonais rise as by enchantmentramparts and towers; ditches are dug with palisade and pointed stakes. Meantime the count de Montfort arrives from

Provence, full of rage and swearing to make Toulouse a desert.

The city of Toulouse, built on the right bank of the Garonne, was connected by a bridge with the county of Gascony, Comminges and Foix.

Its perimeter did not have the extent that it has acquired since. On the north the walls rested on a work built on the Garonne, and that was called the Bazade or tower of Bazade; directed to the east and passing the place of the present capitol, it turned to the south along the apse of the cathedral church of S. Etienne; descended to the southwest, following t the present Rue Mountoulieu; then at the height of the old g gate Mountoulieu or Montolieu, it went straight west to reach the arm of the river above the church of Dalbade.

On this side at the south, outside the walls and about 492 ft. from the Garonne, rose castle Narbonais, a vast fortress that commanded the gates of S. Michel, Montgaillard and Montolieu. [1] Meadows, orchards and gardens extended on this side from the Garonne to the hills that now extend along the canal of the Midi. On the river above existed a corner tower connecting the city to an island. Toward the east the ramparts then formed an arc of a circle, and at the north joined the walls of the abbey of S. Sernin, that forming a reentrant angle descended to the river below, at the point where was established the tower of Bazarde. The bridge, some remains of which are seen, a little below the middle of the city, ended at a head palisaded by the inhabitants, a tower and a hospital, which could be defended at need.

Note 1.p.384. Now Mountoulieu.

In his wrath, Simon de Montfort on his arrival desires to penetrate into the city; but his brother and the chevaliers shut within castle Narbonais [2] make him understand, and not without difficulty, that this undertaking could only have bad results. Disdaining these revolted citizens, the count took no measures at first; he contented himself with collecting his men, supplied castle Narbonnais, terraced the curtains to place those mangonels and stone-throwers, and without investing the place by enclosing works, he pretends to force it by a vigorous assault at the side of gate Montolieu. The men of t the city await him, not behind their recently erected gates, but outside in the meadow well palisaded and furnished with

flanking wooden works and good ditches. The attack of the French is supported by the garrison of the castle, that sent into the meadow arrows and stones. Yet Guy, the brother of count Simon, is wounded, a good number of barons are slain, and on the advice of Hugues de Lascy, the order is given for retreat.

Note 2.p.384. It is scarcely possible today to give an account of the position of castle Narbonnais, of which remains not the least vestige. But that work was enclosed within the walls of the city about the end of the 13 th century, and a century since allowed one to see its outer enclosures. Plans possessed by the city of Toulouse, and that M. Esquie, architect of the department of Haute-Garonne, has been pleased to cause to be traced for us, give that enclosure, which comprises the entire area of the present palace of the imperial court, and was limited next the Garonne by Rue de l'Inquisition, on the north by place de la Vigerie and Rue des Fleurs. At the south, the walls of the castle formed the defense of the city, and in the 14 th century opened on a barbican, that existed until the end of the last century. But in the time of Simon de Montfort, there were at least 328 ft. between castle Narbonnais and the wall of the city.

Count Simon was filled with gloomy wrath, again entered castle Narbonnais, and silently heard the advice of his barons and of his clerical advisers. One of them, Dom Foucault, spoke thus:-- "To have satisfaction from the city of Toulouse and exterminate its inhabitants, it would require us to make such efforts, that after us it would be spoken of by the world. Let us build a new city with houses and defenses. We should be the inhabitants of that new city; a new population will come to it. That will be a new Toulouse, a new lordship, and never has such a noble resolution been taken, for between that city and the old one will be a constant and bitter strife, until one destroys the other finally. And the one that remains will be the mistress of the country. But until then we shall gain by this method, for from all sides will come to us men and women, provisions of all kinds. Consider that it is necessary for us to besiege that city a long time to destroy it. You will never have the strength, for never was a city better defended. Let us devastate the vicinity; let there remain neither a shoot nor a tree, or a grain of salt, and thus you will

reduce those men." -- "Dom," said the count, "your advice is good." "Not so good," said the bishop,"for if those in the c city possess the Garonne and its opposite bank, there will come to them from Gascony such aid, that during our lives they will lack nothing." "By God, lord bishop," said the count, "I and several barons will go on the other bank, my son and my brother will guard here." Thus was taken the resolution to invest the place completely. The bishop, legate, prior and abbot went to preach the crusade and recruit troops.

On all sides, men labored in the city to strengthen the defenses; in the camp of the besiegers to build the new city, they surrounded it by ditches and palisaded earthworks with battlements, gates and watch-towers. It was divided into quarters, the streets are traced, and they cause to end there roads well metalled to facilitate arrivals. Castle Narbonnais becomes its citadle. Meanwhile count de Montfort passed the Garonne at a ford above, at the head of half his forces. He established himself on the left bank. Without leaving him any rest, the besieged threw themselves on the bridge, filled the barbicans forming its head, and fight his troops day and night. To Toulouse also come to enclose themselves, other lords with their well armed companies, the count de Foix, Don Dalmace, Arragonese and Catalans. Encouraged by these reinforcements, the men of Toulouse make a sortie and compel the count de Montfort to repass the river and to concentrate again around castle Narbonnais in a great intrenched camp. Soon the army of the French is more occupied in defending itself than in attacking. The besieged make trenches before their ramparts and banks furnished with palisades; they build bays well flanked, so that archers and slingers can make a good retreat, if repulsed. They erect behind the palisades stone-throwers, calabrians and trebuchets, that continually batter castle Narbonnais. On the walls the carpenters build double defensive galleries. The field of Montolieu is a list where are daily combats, so much that one does not know whether the French besiege Toulouse, or the men of Toulouse besiege the great intrenched camp of count Simon. One winter morning at dawn, the French desire to surprise the city; they are armed during the night and throw themselves furiously on the defenses. They have already crossed the ditches filled with water

and overturned the palisades. Castle Narbonnais sends projectiles against the place and assist the assailants, but who end in regaining their camp without having accomplished anything. Thus pass two more months, and the city guards and defends itself better than ever. New crusaders are brought by the bishop and come to increase the army of count Simon. The men of Toulouse also receive reinforcements led by Arnaud de Vilamur; t they daily erect more extensive defences, gain ground, and b build good masonry walls behind the ditches and well guarded palisades.

After a fruitless attack against that extension of the defenses of the city, the count de Montfort sees himself compelled to move his camp back half a league, abandoning a hundred barracks and the boilers of the canteens. The men of Toulouse then attack castle Narbonnais. They are arrested in that enterprise by a great freshet in the Garonne. Several of their defenses are thus cu off from the city by the water; but without being discouraged, they supply them by the aid of boats, ferries, rafts and rope bridges. Count Simon profits by this circumstance to batter so strongly with his trebuchets and stone-throwers one of the projecting works located on the other bank of the Garonne, that the defenders are deprived of munitions and seeing all their battlements broken down, are compelled to abandon it.

Count Simon enters the abandoned tower, and plants his banner there; but the struggle continues in the water, on horses, in boats and on hurdles. Each shed around the head of the bridge is disputed. The hospital is taken by the French and crenelated; thus they hope to hold the two places, one on the right and the other on the left bank to starve the city; for with the numerous reinforcements that he has received, count Simon has extended on the right bank his enclosing line to t the enclosure of S. Sernin.

But he lacks money, he no longer knows what expedients to employ to pay such a great number of men (100,000 as the chronicles state). He must force the siege or shamefully raise it; then he conceives the building of a cat of carpentry, a sort of rolling shed that he will push up to the ramparts on the bottom of a ditch; a cat so well covered with iron that it will fear neither stones nor beams, that can be thrown or

dropped on it. Four hundred chevaliers enter it, and if they do so well, they will pierce the defenses and enter the city.

The coun has established his headquarters on the left bank, but the continued sorties of the men of Toulouse compel him to pass the river to aid the first camp. He finally perceives t that his troops are too poorly protected, that on a long line of investment, they have but a single point of support, castle Narbonnais.

Having become master of the head of the bridge, after it h had been carried away by the freshet in the Garonne, he dicided to convert the hospital near it into a fortress, "with l lists and battlements, defensive walls, external palisades, abattis of trees, deep ditches entirely around it and filled with water." On the bank of the river the count projects a raised bank of earth, that will allow him to cast projectiles on the barks that come to provision the city; from the bank of Gascony he will throw a bridge over the ditch with a stairway. Yet here are the boatmen and citizens of Toulouse, who cross the Garonne on barks and come to fight the workmen and the defenders of the head of the bridge. The entire attack a and defense bear on this point. The part of the bridge still belonging to the city is furnished with a tower, and the French take it; the men of Toulouse assail them by water and by land. At the end of the bridge next the city, they built a s stone-thrower, and strike so well that tower still roofed, t that the men of the count are compelled to abandon and set fire to it. Another time 163 Brabantines and Thiois leave Toulouse, pass the river and come to attack the French posts established along the water. Taking them in the rear, they throw them into the Garonne and return in their boats.

In the parleys that the count of Montfort held with the lords crusaders, he continually complained of the lack of money in which he found himself; he adjured them to push this siege. -- "But," Amaury replied to him one day, "you will never attack the defenders of the city so many times daily, that you will not find them outside the lists in the open country, and you will never enclose them within the city."

The cat is finally completed. It is pushed toward the ramparts; it is so greatly damaged by the projectiles of the trebuchets of the besieged, that the men within it dare not remain

there. Then before that shed protecting the besiegers could be repaired and used with greater success, the men of Toulouse built within the lists a thick rampart of masonry. The women and children labored without rest on that work, while the French worked their machines and cast stones and arrows.

The cat is strengthened and furnished with new ironwork; t the companies of knights reenter it. Before it the defenses are increased in front and flank; they are marvellously filled with armed men. The ditches are defended by palisades; behind, the walls are protected by defensive galleries newly built. Both sides prepare for a decisive battle. The men of Toulouse begin the attack; they come from all parts against the cat; in boats against the defenses of the left bank; to the plain of Montolieu against the posts established between the city and castle Narbonnais; from the side of S. Sernin a against the end of the enclosure.

The French lose ground and abandon the attack on the walls to place themselves in battle array on the plain. The count of Montfort feared to be cut in two, recognizing the danger in seeing his line of battle too greatly extended; he gives the order to concentrate 60,000 combatants, places himself at their head, and makes a terrible charge, that drives the besieged back to their defenses. But there the projectiles cast from the city stops the fury of the French; the archers and slingers of Toulouse were hardened in war, and extend as skirmishers along the flanks of count Simon's column of attack, dismounting the horsemen and throwing that mass into confusion. The brother of the count is grievously wounded, and while Simon de Montfort dismounts to bring him aid, he is himself struck by a stone, that breaks his skull. The chronicler states that this stone was cast by a stone-thrower worked by women near S. Sernin. A few days later, a new attack having been attempted without success, the siege was raised (1218).

The remains of count Simon de Montfort were taken to Carcassonne soon after raising the siege and deposited in the c cathedral of S. Nazaire. In that church, rebuilt in great part at the beginning of the 14 th century, was found a relief of very rude work cut in the local sandstone, which perhaps came from the tomb of the count, and which represents the last phase of the siege of Toulouse. The arms and clothing of

the persons belong to the first years of the 13 th century. Before an edifice with towers and battlements extend two rows of palisades. The inner palasades are composed of piles set close against each other, while the external defense is composed of interwoven branches. Between these two obstacles extend the lists, and the combat occurs in that space. On both sides the knights plant their banners, and the fight rages around them. Below the fortified edifice, whose curtain is decorated by columns, is sculptured a very curious stone-thrower, of which we give a copy(Fig. 1). The beam of the stone-thrower is reinforced in its upper part by two timbers, and the three timbers at their ends are held between wide pieces, that are probably of heavy metal. Six rings are attached at the bottom, to which are fastened six ropes. The three timbers forming the beam are also supported by a cross-piece containing the pins that turn in the tops of the two side posts furnished with X-braces and struts. Six persons, among whom are seen two men, pull on the ropes. Over these persons is a floor. A loader p places a round stone in the pouch of the sling of the machine. We presented in Art. Engin, Figs.12 and 13, a machine analogous to this.

The crenelated edifice shown in the relief above the machine is perhaps the church of S. Sernin. In the upper part of this relief is sculptured a scene representing a dead man borne by men-at-arms. An angel receives the soul, that in the form of an infant leaves the corpse. This relief may be regarded as reproducing the event, that ended the siege of Toulouse in 1218

Two important facts are shown by the poem on the Croisade contre les Albigeois. The first is that count Simon de Montfort in order to have a seasoned and compact army enabling him to undertake and continue long sieges, is compelled to pay this army with his own funds, and that ho procure the necessary sums, he pillages and ransoms the country. The barons are crusaders for the redemption of their sins and owe but 40 days of campaign; after which they return home, then caring very little for the result of the undertaking. Not on that body co-could Simon de Montfort count for reducing a city like Toulouse and performing the work of a siege.

Every military chief that desired to have an army suitable to pursue and terminate a long undertaking like a siege must

pay it, the service of the feudal militia being limited. Then for that chief was nelessary a treasure, and he could procure it only by war.

In the second place, this poem clearly indicates the constitution of one of those municipalities of the South at the end of the 12 th and beginning of the 13 th centuries. Everything in the city is done by the "capitouls;" the organization of the defense, supplies, pay and food of the troops concern the municipal magistrates. Count Raymond and the nobles, that came to his aid, only have to fight; resolves are made together with the municipal authorities, and the advice of the count has no value till it is ratified by this council.

When the son of the king of France comes later to besiege Toulouse anew at the head of fresh troops, it is only after a common deliberation in which the count gives his opinion, that the decision to resist is adopted. Then the consuls are responsible for the supplies, for feeding the troops and for putting in condition the defenses.

"They order [1] that the best carpenters go to erect in the entire city at the different posts the machines, the "calabres" and stone-throwers, and that Bernard Paraire and master Garnier go to tend the trebuchets, for that is their office. They designate in all the quarters commissarys, knights, citizens or the richest merchants, to cause the gates to be fortified and command the workmen. And all set themselves to work, the common people, young men and girls, ladies and women, young boys and girls, the little children, who sing their ballads and songs and labor on the walls, ditches, earthworks, bridges, barriers, walls, stairs, ramps, defensive galleries, posterns and halls, lists, slots, flankings, forts and watch-towers, wicketsof communications, trenches, vaults and caponnierres. They entrusted the command of all the barbicans, including t that of the Greve, to the counts and the noblest chiefs. The city is thus put in defense and doubly fortified."

Note 1.p.330. See verse 9421 et seq.

We do not have to write the history of those unfortunate p provinces of Languedoc during the first half of the 13 th century. Crushed beneath the cruel coalition of the armies of the North, delivered to the inquisition and the spite of the Catholic clergy, those municipalities, so flourishing in the 12 th

only arose to fall more heavily. In 1240 the young viscount Raymond de Trincavel, last of the counts of Bezieres, and in 1209 placed in the hands of the count of Foix (he was then two years old), suddenly presented himself in the dioceses of Narbonne and of Carcassonne with troops from Catalonia and Arragon, took the castles of Montreal, the cities of Montolieu, Saissac, Limoux, Azillan and Laurens, and came to lay siege to Carcassonne.

There exist two stories of the siege of Carcassonne in 1240 written by eye-witnesses; that of William of Puy-Laurens, inquisitor for the faith in the country of Toulouse, and that of the seneschal William des Ormes, holding the city for the king of France. The last story is a report in the form of a journal addressed to queen Blanche, mother of Louis XI. [1] This important document explains to us all the arrangements of the attack and of the defense. [2] At the time of the siege the defenses of the city of Carcassonne had neither the extent nor the strength, that were given to them later by S. Louis and Philip the Bold. The still very visible traces of the walls of the Visigoths repaired in the 12 th century, and the excavations undertaken in recent times allow us to trace accurately the enclosure of the ramparts of the city in 1240.

Note 1.p.391. We have given the translation of this report in Art. Architecture militaire.

Note 2.p.391. The report of the seneschal William des Ormes, and the tale of William de Puy-Laurens, were published and a annotated by M. Douet d'Arcq in the Bibl. de l'Ecole des Chartes. Vol II. 2 nd series. p. 363.

Here (Fig. 2) is the plan of these defenses with the suburbs belonging to them, the barbicans and the course of the Aude.

The army of Trincavel invested the palce on Sept. 17, 1240, and took possession of the suburb of Graveillant, which was immediately retaken by the besieged. The report states that this suburb is before the Gate Toulouse. Now the gate Toulouse is no other than that called today the gate of the Aude, which is a Romanesque structure opened in the Visigothic wall, and the suburb of Graveillant consequently can only be the suburb called that of the barbican. The rest of the tale shows that this first statement is correct.

The besiegers came from Limoux, i.e., from the South; they

did not need to pass the Aude before Carcassonne to invest the place. A stone bridge then existed on the Aude; [3] it is that indicated at P on our plan.

Note 3.p.391 This bridge is still entire today; it is the old bridge, whose construction partly dates from the 12 th century. It was only repaired and furnished with a bridge-head under S. Louis or under Philip the Bold, at the end of the 13 th century.

Raymond de Trincavel was not ignorant that the besieged expected succor, that could inter the city only by crossing the Aude, since it must come from the northwest. So the viscount took possession of the bridge, and pushed his attack along t the right bank of the river above, endeavoring to cut the communications of the besieged with the left bank. Being at first unable to maintain himself in the suburb of Graveillant at G, he takes possession o a fortified mill on the river, sends his troops from that side, lodges them in the lower parts of the suburb, and arranges his attack in the following manner. A part of the assailants, commanded by Olivier de Thermes, Bernard Hugon de Serre-longue and Giraut d'Aniort, camp between the northwest salient of the city and river, excavate enclosing ditches and surrounds itself by palisades. The other division, commanded by Pierre de Fenouillet, Renaud du Puy and William Fort, located before the barbican that existed at B and that of the gate called Narbonne at N. In 1240, besides t these two barbicans, there existed one at D, [1] that allowed men to descend from the castle into the suburb, [2] and one at H facing the south. The great barbican D also served to protect the approaches of the gate Toulouse T (now called gate of Aude).

Note 1.p.393. Rebuilt at a much greater scale by Philip the Bold. But we have discovered the foundations of the former work, now beneath the new church S. Gimer.

Note 2.p.393. The entire defense of the castle dates from the 12 th century.

It is necessary to note that the only points where the external ground may bi nearly on a level with the listsin the lists (for William of Ormes mentions the existence of the lists L, consequently with the external enclosure), are the points O and R. As for the ground of the barbican D of the castle, it

was naturally on a level with the suburb. Further, the entire western front of the city is built on a very high and very s steep precipice. On first retaking the entire suburb from the besiegers, the defenders of the city naturally hastened to t transport within their walls a considerable quantity of timber that was of great assistance. [3] They soon have to renounce m maintaining themselves in that suburb. The viscount then attacks at the same time the barbican and the castle to take from the besieged all opportunity of resuming the offensive, the barbican B (it was then a salient), the barbican N of gate Narbonne, and the salient I on the level of the plateau extending 328 ft. from that side to the southwest.

Note 3.p.3e3. Latin note.

The besiegers camped between the place and the river being in a very bad position, they also entrench themselves with c care, and cover their fronts with such a great number of cross-bow men, that none could leave the city without being wounded. Soon they erect a mangonel before the barbican D. [5] The besieged on their part and within that barbiman erect a Turkish stone-thrower that batters the mangonel. To be as much protected as possible, the mangonel must be established at E. A little later, the besiegers begin the mine under the barbican of gate Narbonne at N, starting their mine galleries from the houses of the suburb, which at that side nearly touched t the defenses. The mines are shored with timbers, that are set on fire, causing the fall of a part of the defenses of the b barbican. But the besieged have countermined to arrest the p progress of the hostile mines, and have retaken the half of the barbican left standing. They by mining at the two principal points of attack, the men of the viscount attempt to take the place; these mines are pushed with great activity; they are no sooner discovered than other galleries are begun. The besiegers do not limit themselves to these two attacks. While they batter the barbican D of the castle and mine the barbican N of gate Narbonne, they seek to take a part of the lists, [1] and they combine a serious attack on the weak point at I, [2] b between the bishop's palace and the cathedral of S. Nazaire, marked S on our plan. As we have stated, the plateau at that point extends nearly on a level with the interior of the city from I to O; and that is why S. Louis and Philip the Bold built

outside the Visigothic walls a considerable work on this salient. The attack by the troops of Trincavel is from this side (the weak point), and very strongly pushed; the mines reach the foundations of he wall of the Visigoths; [3] fire is set to the shores, and 10 fathoms of the curtains fall. But the besieged have repaired behind them with good palisades and defensive bays; so that the men of the viscount dare not attempt the assault. This is not all, a mine is also made before gate Rodez at B; the besieged countermine and repulse the hostile laborers. Yet breaches are made at various points; viscount Raymond de Trincavel fearing to see at any moment appear relief troops sent from the north, and he decides to attempt a general assault. His troops are repulsed with considerable losses, and four days later, at the news of the coming of the royalists, he raises the siege, not without setting fire to the churches of the suburb, among others that of the Minorites at R.

Note 1.p.394. Not designated in the report of William des Ormes.

Note 2.p.394. Latin note.

Note 3.p.394. Latin note.

Note 4.p.394. The gate of the wall of the Visigoths still exists, but only opens today on the lists of S. Louis. It is a Romanesque construction and was restored in the 13 th century. This is the gate that Besse calls the gate of Amondiers or of Ameliez, because of the little wood of almond trees found in its vicinity.

This analysis of the documents remaining to us on the siege of Carcassonne shows, that then in the middle of the 13 th c century the work of the miner was the means of destruction m most commonly employed against well fortified places. The troops of Trincavel appeared to proceed with system; they take t the positions most favorable for attack, they occupy the garrison at several points, some weak ones; they direct their l labors against the barbicans of the gates, regarding these as more easily forced than a front. Thus what care and powerful means Louis IX and his son later employed to render these gates impregnable, and to command the salients and weak points!

Note 5.p.394. (latin quotation). At that epoch in 1240 the city of Carcassonne was surrounded by considerable suburbs,

that were demolished after the siege at the order of S. Lo

The besiegers open their mining trenches in the houses, t they occupy around the city,[5] so as to conceal their work from the besieged. They wait till several breaches are made at various points before attempting a general assault. With rear on a river and a fortress in front, they intrench and take possession of defensible points on the river. Finally, not being able to carry th place after a simultaneous atta on the defenses injured by mines, knowing that an army corp comes to the help of the garrison, is going to present itse on the left bank of the Aude and attempt the passage,[1] fear to find itself thus in a country dominated by the city and posed to an attack on the banks of the river, the army of t viscount raises the siege. From the moment when it presents itself before Carcassonne until the moment that it decides return to the South, this army then proceeds with a very rem arkable knowledge of the art of war, and which contrasts wi those foolish expeditions of the French nobility during the 15 th century.

Note 1.p.395. In the month of October, the date of the sie the Aude is generally fordable in the vicinity of Carcasson

Neither means of attack not powerful machines were lacking to the armies of the end of the 14 th century and the begin ing of the 15 th; the miners of the North, the engineers, wo rkmen, hired laborers, are skilful and active; but system in command, the art of directing troops, of distributing them as needed, were entirely lacking, while certain expeditions of the 12 th and 13 th centuries indicate on the part of the chiefs as much talent as experience, frequently even profoun combinations. The investment of Vexin, the attack and taking of castle Gaillard by Philip August, are military operations conducted with all the qualities required for a great captai Not a false maneuvre there, nothing is left to chance. The e foreseen from the beginning is attained gradually and system atically with the prudence suitable for a military chief. Th princes, barons and knights that made war in the Orient, opp osed to the armies of the caliphs and even Greek armies, had formed military habits, lost while feudalism remained in the West. Besides the feudal system established in the Orient in conquered lands and in the midst of races with which fusion

was impossible, possesses a charcater of strength and unity, order and moderation, that it could not retain in the West, where traditions, ancient customs, the remains of the administrative organization of the Romans, and religion, tended to dissolve it. The kingdom of Jerusalem and that of Cyprus are pure types of the western feudal system; those sovereigns have armies, or at least are at the head of an organization, that permits them to be easily formed.

The war made in 1228 by the Lombard troops on Jean d'Iselin, lord of Bayreuth and king of Cyprus, the success of those troops and their reverses in spite of their numbers under the attacks of the feudal army of the king, are striking proofs of the power of that organization developed in the East by the western barons.

One is too much inclined to see in feudalism only the subdivision of power among the lords whose connections were frequently broken; feudalism is judged by its last moments, when undermined by the royal power; by the enfranchisement of the communes, by its own faults and the ruin of the great fiefs, it was no longer more than an injurious movement in the midst of a state, tha tended to transform itself and become a monarchy.

If feudalism in the West could not and never had armies, it was not the same in he East, where it was constructed in a single piece, and where it could develop according to its principles. Unity of action results from that constitution. Feudalism as we see it established in the kingdoms of Jerusalem and Cyprus, allowed a high court in which all the lieges of the sovereigns had the right to sit. This sort of parlement decided all questions, not only suits against gentlemen, but affairs relating to war, the transmission of the crown, to the guardianship of the minor princes.

In a campaign, nothing was done till after the councli of the barons, and the words attributed to Philip August before the battle of Bouvines are exactly according to the military customs of the time. The general obtained the superior command, when this occurred, only by the votes of his peers, as we saw practised in the army of the crusaders at the siege of Antioch, and those barons of the 12 th and 13 th centuries, that some are pleased to present as brutes, only good to show themselves

with heads down into a fight, on the contrary were habitually men of letters, orators, lawyers, administrators and captains.

In 1213 the barons besieging Dacietta "beguiled the weariness of the long blockade in discussing the most abstract questions of feudal rights." Philip of Navarre, captain, lawyer, diplomat and poet, who placed Ibelin on the throne of Cyprus by the help of his sword and his high reasoning, cites with lively animation the "learning of Amaury II, king of Jerusalem of Bohemond III, prince of Antioch; of Raoul of Tiberias, of the lord of Bayreuth, of the lord of Sidon and of many others." The father op Richard Lionheart read Vegetius in his tent; a and if the feudal code in force in the possessions of the Franks in Syria and Cyprus informs how much instructed anf foreseeing were those barons of the 12 th aud 13 th centuries, t the fortresses that they erected in those countries throw light on their military intelligence. [2]

Note 1.p.397. On this subject see Notice sur lo vie et les ecrits de Philippe de Novarre, by M. Beugnot, Bibl. de l'Ecole des chortes. 1 series. Vol. II, p. 1.

Note 2.p.397. With regord to those fortresses, consult the Memoirs published by M. Emmonuel Rey.

In France, if one studies with some care strong places like Coucy, Chateau-Gaillard and so many others built between the end of the 12 th and the beginning of the 13 th centuries, he very quickly recognizes a very complete art, from the point of view of the defense. Now is it possible to admit that men so intelligent in preparing the defense were not as much so when it referred to conquering. On the contrary, the power a and sagacity of the assailant developed foresight and energy of the defense. The barons of the 13 th century would not h have had to seek and find those defensive resources, if they had not been compelled by the skill of the attack. It must then be recognized, that a siege at that epoch was not an operation left to chance and to the bravery of undisciplined soldiers, proceeding without entirety and system. Plans of a attack exist no longer, the descriptions are brief or are generally made by persons not military; but the fortresses attacked are partly standing, and their good arrangement, the foresight that appears at every point, sufficiently indicate what was the means of offense.

We stated at the beginning of this Article, that there is no army where there are no people. At the origin of the feudal system, there are only warriors, all nearly equal, and below is the common people, which has no interest in sharing the d dangess of the new conquerors. But when the feudal organization reached its climax, affairs no longer proceeded thus, and the wars of the Orient contributed much to attract the peoples into military labors; even better, plebians became knights a and knights became lords, sometimes crowned nobles. By feudalism the art of war thus became a career open to genius, even that which appeared in the lower ranks of society.

If in our days a siege is frequently a long operation, difficult and dangerous, that requires a skilful chief, prudent, patient and tenacious, yet the preliminary works, such as opening trenches, the establishment of places of arms and batteries, are done at a very great distance from the works attacked. Before the use of cannon it was no so. The place invested was immediately attacked, and a siege commenced as soon as the lists or barriers were forced, as the miners reached t the scarps, and the cats were established, as well as the galleries or portable wooden towers for overthrowing or commanding the defenses. The attack must be direct, close and hence active and incessant, to allow the besieged no leisure to destroy works that generally could be built only after desperate combats at the foot of the walls, within the lists or before the palisades. If the ramparts were too high or too well equipped with defensive galleries for it to be possible to attempt scaling; if they were sufficiently thick to resist the effect of projectiles cast by machines or the battering ram, it was necessary to resort to mining. The art of the miner seems to have been developed in the wars of Syria, and to have been e especially practised by the men of the North, Flemings, Brabantines and men from Boulogne. It is certain that this art was carried very far after the beginning of the 13 th century.

There were different kinds of mines and different modes of mining. If the place besieged were built on a precipice of rock, on level ground, or surrounded by moats filled with water, the work of the miner was modified according to these different locations. It was necessary to approach the rampart, the tower or the curtain. If the defense were elevated on a

precipice of rock, wooden galleries within each other and sliding out in sections like the tubes of a telescope were gradually moved up to the surface of the rock. Reaching that, the miner attached himself to the rock and began to excavate in passing obliquely upwards, and ascending under those foundations and at the point where resting on the rock, he cut horizontal zigzags, taking care to shore the mine gallery behind him. When it was judged that he had undermined a sufficient extent of the rampart, the workmen withdrew after having piled fagots in the gallery and set fire to this wood; the shores were burned and the wall fell. In this case the besieged c could not be ignorant, that their ramparts were mined, since they saw the cat gradually advance to the rock on which the defense rested. They attempted to destroy by fire or by heavy projectiles this cat or gallery, that reached the foot of the rampart, but if unable to destroy it, if the miners were at work, there was no other resource than to countermine. Frequently the miners from outside and those from within worked at some paces apart without meeting.

If the defenses were established on level ground with dry ditch and counterscarp, the besiegers opened their mine at a sufficiently great distance in the houses of the suburb, behind walls or ridges of the ground; they sought the ground under the ditch and crossed it by a tunnel, arriving beneath the foundations of the ramparts, and began their shored galleries and chambers. Then the besieged might be ignorant that they mined and at what points the miners aimed. They sought to discover their presence by placing in the defensive galleries small basins filled with water; when the surface of the liquid was seen to be wrinkled, they deduced the inference th that the miners were working under that point, and they countermined. If the place was surrounded by water, for the miner to reach the rampart, the ditch was gradually filled by means of branch trenches along which were brought materials; thus was formed a causeway on which the cat was successively extended till it reached the counterscarp. Then the miner attacked it. This mode of procedure, like the former, designated to t the besieged the point where the walls were being sapped; if that sap could not be opposed, it was seized in the rear. Sometimes the besieger did not attempt to make a breach by overt-

overturning several fathoms of masonry, but he excavated a m mine gallery under the foundations, then ascending gradually and shoring up to the level of the ground inside the place, he left over his head only a well shored shell; then awaiting the night, he dropped the shell and entered the place by that entrance. These kinds of mines were practised, so far as possible, near the gate, so that the few determined men that first sprang from the end of the mine could throw themselves on the guard at the gate, raise the portcullises and open the g gate to the attacking column all prepared and concealed outside Fig. 3 indicates the mode of excavating mine galleries under the masonry of the towers at A and of the curtains at B to m make a breach. These galleries are made zigzag to allow the substitution of the internal and external surfaces. The shores are set double as seen at D. These props being burned, the weight of the upper masonry loading the outer disintegrated surface, it crushes and the work falls, sliding at the base so as to form a slope permitting an assaulting column to climb over the ruins. The section of the tower A shows at a the mine gallery passing under the ditch wit an inclination toward the outside, so that the miners may not be drowned in case -- as often done -- the besieged having sufficient water at command, seek to fill the galleries. The shores being burned, t the masonry of the tower could not fail to fall as indicated by the line b c, the foot of the structure sliding to c. At C is a direct gallery, intended to open into the place without maging a breach. In a very great number of strong places of the 12 th and 13 th centuries, one can prove the use of these means, either by the manner in which the ramparts have fallen, or by the remains themselves of the incompletely filled mine galleries. [1] To guard against these dangers, military constructors often established the ground stories of towers on a s solid mass, [2] or if they made the facing of cut stone of moderate hardness, they took care to make these masses of boulders or very hard rubble, or indeed if the work was of great extent, like a strong barbican or a very large tower, they built entirely around the masonry under the batter a countermine gallery, into which the hostile miners could penetrate, and where they were received as may be imagined.

Note 1.p.339. Notably at the ramparts of the city of Carcas-

Carcassonne, the ramparts of the bailey of the castle of Coucy, and at the castle (old) of Chauvigny.

Note 2.p.399. Thus are established the towers of the city of Carcassonne, rebuilt on the old towers of the Visigoths.

Thus was conceived the curtain of the keep of Coucy.

We have given the plan of that castle in Art. Chateau, Fig. 16, and that plan will sufficiently explain the purpose of th that curtain; it completely isolated the keep, while providing for the garrison an exit to the outside, well masked and well defended.

A detailed plan (Fig. 4) explains the arrangement of this exit.

Above the batter the curtain has a thickness of 16.1 ft., a and at the level of the ditch A of the keep is 27.7 ft. [1] The entire space a b is then occupied by the batter. Beneath this batter is made the countermine gallery B. The besieged reach it, either from the interior of the castle by the stairs C; then it is necessary to open the barred door D and raise the portcullis H; or by the bottom of the ditch A of the keep. T The postern P allows men to go from this gallery B, crossing the great ditch F on the wooden bridge p, to another outer p postern pierced in the wall of the bailey and furnished with a drawbridge; this bridge is commanded by the great curtain G of the castle [2] and is crenelated at E next the great ditch. Thus if the besieger held that ditch, he could not prevent the garrison from communicating with the outside, for the external postern itself is commanded by one of the towers of t the castle. It should be stated that the great ditch F is excavated in the rock and is about 82 ft. wide. If the besieger held the bailey and came to establish himself in this ditch beneath the covered galleries, covered from projectiles cast from the defensive gallery of the curtain, and desired to ruin that curtain, he could scarcely do so except at the level of the bottom of the ditch. Then having removed the masonry to a depth of 3.3 ft., he would find over his head the gallery of the countermine. The section (Fig. 5) made from O to M on the preceding plan indeed shows at I the rock bottom of the great ditch, and at R the countermine gallery of the curtain under the batter. At S (see the plan) is an abundant spring at the level of the floor of the gallery, excavated like a

well (see S′ on section). Assuming that the besiegers have m mined under the countermine gallery, it was easy for the besieged to prevent them from setting fire to the shores of the mine.

Note 1.p.401. The ditch of the keep is paved on masonry laid on the limestone rock.

Note 2.p.401. For the arrangements relating to the entirety of the defense, see Art. Chateau, Figs. 16, 17, 18.

This case and the infinite precautions are the proof of the valor and skill of the miners at that epoch. [1] The countermine gallery nowisi lessens the strength of the curtain, since that gallery is placed under the batter. At the middle of the arc of the curtain, the gallery is in direct communication with the upper defensive gallery by a stairs built on a rectangular plan. [2]

Note 1.p.402. The construction of the keep of Coucy and of its curtain dates from about 1225.

Note 2.p.402. Art. Chateau, Figs. 16, 17.

When the besiegers attacked an important place, they first of all held to obtain possession of the barbicans, because t the barbicans being taken, it became impossible for the besieged to attempt sorties, and then the works of the siege could proceed without having to fear their destruction. The stone-throwers, mangonels and trebuchets having only a range of 492 ft., it was necessary for establishing batteries of these machines, to first ensure that the besieged could not come at once to break or burn them. Besides, the barbicans forming considerable projections thus afforded flankings, which it was first necessary to take from the besieged. When the barbicans were taken and the lists were occupied or swept by external works, the investment was effective and the operations of the siege were conducted regularly. By the aid of machines erected on platforms, on towers or behind the curtains, the b besieged could not prevent the construction of the works of the besiegers, who protected themselves by epaulements and m mantlets, and who posted behind hurdles archers and crossbow men constantly occupied in covering the battlements of the d defensive gallery with projectiles. The first operations of the besiegers before a place well equipped and well defended,

then consisted in getting possession of the barbicans. Having these, they had the lists; then the garrison could no longer make sorties from the place, and then were begun the mining works to make a breach, or also the approach of movable towers intended to throw an attacking column on the defensive gallery

Note 1.p.403. Arts. Architecture militaire, Figs. 15, 16; Engin, Fig. 32.

In 1216 Louis, son of Philip August, had laid siege to the castle of Dover, at the head of a numerous army corps. Before the castle of Dover was a barbican well palisaded with oak logs and surrounded by a ditch. Louis left a part of his troops below in the city, and went to establish himself on the cliff before the fortress, in order to complete the investment. "Then Louis erected his stone-throwers and mangonels to cast at the gate and the wall; he had made many hurdles and a cat to reach the wall; his miners entered the ditch, mined t the wall and the earth beneath the towers. Then he caused it to be assailed from the east by knights; thus the barbican was soon taken." [2] To take the barbican of Dover, they built before it a fort of wicker baskets filled with earth, according to custom. Thus was obtained a command over the works of the barbican; a battery of machines was placed on that fort, then pushed forward a cat in the trench to the foot of the wooden defense and mined under this. The barbican being taken, Louis caused one of the two towers of the gate to be mined, which falls. The column of assault sprang forward; but the besieged repulsed it vigorously, and then barricaded the breach and piled there oak logs, rafters and planks, so that the place di not fall into the power of the French. We always see the besiegers establish before places these forts, terraced castles, faced with palisade and hurdles, to erect their batteries of machines. This is the Roman mound. At the siege of Toulouse, castle Narbonais (partly terraced by Simon de Montfort) took its place. Sometimes these forts even became actual lines with their curtains and flankings, all being terraced. From these start the trenches that end in the ditch, and allow the cats to advance. These cats, previously mentioned elsewhere, [1] were built beyond the reach of the machines of tho besieged and brought on rollers or trucks to the edge of the ditch, then pushed on hri filling to the foot of the rampart. Thus the

besiegers had a gallery well covered by strong planks covered by sheet iron, fresh hides or wet earth, that allowed the miners to attack the foot of the wall, and later when the mines were ready, for armed men to rush into the place. Those cats, as I have stated above, sometimes consisted of two or even t three bays inside each other, as indicated in Fig. 6 at A. Thus after having made an inclined trench in the counterscarp of the ditch (see the whole at B from a to b), after having made of the earth from that cut a mound at c at the right and left, the cat is made to approach with its inside gallery on wheels like the principal one; then through the front end the ditch is gradually filled, and the inner gallery is rolled f forward with the filling, thus until the front opening has t touched the foot of the rampart or the rock. During this time from the terraces of the external forts the besiegers continually send a hail of great stones on the point attacked; the defensive galleries being broken in pieces, the archers and crossbow men cover the battlements with projectiles. The rapidity with which the defensive galleries were destroyed by the aid of the mangonels, and the ease in burning them, caused the adoption of stone machicolations with battlements also of masonry. This system of defense appears to have been first adopted in the Orient, for one sees them on the Christian defenses of Syria, that date from the end of the 12 th century, i.e., about a century before their use in the West. But it should not be forgotten that the orientals possesses machines superior to ours, and that the efficiency of their fire must have caused the prompt adoption of defensive galleries with stone battlements by western men established in Syria. In adopting machicolations with covered battlements of stone to more efficiently resist casting machines, they renounced slots pierced in the bases of the ramparts, and on the contrary held to giving a very great thickness to these substructures, perfect h homogeneity and great hardness, to present to the miners more serious obstacles. The little terraced castles or forts were sometimes sufficiently high to allow the besieging army to command the defenses of the besieged. To erect a fort, they profited by the nature of the ground. Thus in the establishment of strong places, precautions were taken to place opposite accessible or dominant approaches, one or more towers higher

than the others. These towers were often vaulted in all stories, with a platform an top to allow the placing of batteries of machines to command the vicinity; which did not prevent t the constructors of fortresses from erecting advanced works much more extensive than generally supposed, to retard as much as possible approaches to attackable points. When one carefully examines the vicinities of the castles and strong places of the 12 th, 13 th and 14 th centuries, one still finds traces of terraces at distances of 323 to 492 ft. from the ramparts, and those terraces of very small height were crowned by palisades. Those terraces with their ditches were very strong however, so that after some fruitless assaults, men must have recourse to mining to get possession of them.

Note 2.p.403. Hist. des ducs de Normandie, manuscript of the imperial Library, published by Franc. Michel (Societe de l'h histoire de France). 1840.

Note 1.p.404. Art. Architecture militaire. (The shed or "musculus" of the Romans).

We find in a romance of the 13 th century, Messire Gauvain, by the troubadour Raoul, [1] a very curious description of a siege of a castle by the men of the lady of Gautdestroit. The besiegers commence to reconnoitre the place; they find a weak point where the walls are low, where the ditch is falled and the masonry is damaged. They establish themselves opposite to that point, and make their report to their chief (the lady of Gautdestroit). Then they bring the troops, cart the mangonels and stone-throwers, and entirely invest the fortress. A stone-thrower is erected opposite the weak curtain; two mangonels are raised before a drawbridge to destroy it as well as a defensive gallery. The assailants also build a little castle 10 fathoms in height. [2] In the wooden gallery crowning it is posted the chief with his archers, infantry and crossbow men. Five days are occupied in erecting these works and in mounting the machines. After this the lists are attacked and then the the ramparts of the castle. [3] They resist the assault by casting stones and tiles, burning charcoal and boiling water. The assault not having succeeded according to the desire of the besiegers, at night [4] more than 20 miners descend into the d ditch to pierce the wall; they succeed in causing three fathoms of it to fall, but the men of the castle bring great logs

and erect a defensive gallery within the fallen wall, etc.

Note 1.p.406. This poem was published by M. C. Hippeau. 185 Aug. Aubry, editor.

Note 2.p.406. The same. Verse 2877 et seq. Old French poem.

Note 3.p.406. The same. Verse 2900 et seq. Old French poem.

Note 4.p.406. The same. Verse 2928 et seq. Old French poem.

It is perhaps necessary to present with more precision those last operations of a regular siege in the 13 th century. Combining then the different written documents that we possess, the figures scattered in manuscripts or reliefs, and especially the works erected by the assailants, one can obtain a sufficiently accurate idea of the considerable works required for taking a well defended strong place.

In the fortifications of the 13 th century, the towers are spaced 154 ft. apart at most, i.e., at the reach of a crossbow bolt. The ditches are 32.8 to 49.2 ft. wide, if filled with water and sometimes more if dry. The height of the curtains from the floor of the battlements to the level of the crest of the counterscarp varies from 26.3 to 39.4 ft. The towers always dominate the curtains. It occurs that the curtains attain a greater height, but that is rare.[1]

Note 1.p.407. Here is only a question of the city walls. In castles the curtains adjoining buildings were sometimes much higher; but the defenses of castles vary more than those of city walls.

When men attacked a wall built under good conditions, well flanked, equipped with defensive galleries and protected by ditches, a salient was chosen as still practised today; but the point of attack, where it was desired to make a breach and deliver an assault, was rarely a tower. The towers were closed at the rear; the miners that succeeded in entering t them found themselves surrounded, and must pierce the other part of the cylinder to enter the city. Thus the attack was d directed perpendicular to a curtain between two towers. It w was then necessary to destroy the flankings of that curtain, i.e., the defenses of the towers at right and left.

The barbicans and lists being taken, the garrison shut up in the principal place, the place invested, men passed through trenches to the counterscarp of the ditch. Since the towers commanded considerable areas, it was necessary to protect the

trenches by banks and palisades or mantlets, higher as they approached the counterscarp. These trenches having reached the border of the ditch opposite the point of attack, fascines were brought, wickerwork, and a protection from the projectiles of the besieged was made by the aid of these materials; two stone-throwers were placed there, and although dominated, they threw blocks of stone on the defensive galleries or over the walls, occupying the besieged, and could destroy their ma machines placed behind the defensive galleries, either on the ground of the place if this were raised above the soil inside, o on platforms of carpentry built behind the curtains. To t that point were then carried timbers, hurdles, fascines and e earth, and always by covering themselves by an embankment in front, they erected a little rectangular fort, terraced between the hurdles o to a proper height for battering the adjacent towers and curtain. The elevated fort with slopes for ascending it was equipped opposite the curtain attached with a high mantlet of carpentry and hurdles, covered by coarse cloth, felt or fresh hides, to stop the bolts of the besieged and obstruct the stones or fire thrown by their machines. On the p platform of the fort were erected two s one-throwers. Now taking the dimensions of a stone-thrower according to the statement of Villard of Honnecourt, one finds for the area of that machine 39.4 ft. length by 23.0 to 26.3 ft. width. To place two machines of that size, To place two machines of that size, it was necessary for the platform (assuming it square) to have 78.7 ft. on a side. Those two stone-throwers battered the two flanking towers without ceasing, destroyed their defensive g galleries, and crossbow men posted either on that platform or on the banks of the trenches, shot at all defenders, that appeared to repair damages or to shoot without cover. One or mo more stone-throwers were further charged to destroy the battery of machines, that the besieged did not fail to establish behind the curtain. Still, beneath the fort had been reserved a passage or corridor in which was brought a cat like that presented in Fig. 6. If the besieger with his machines succeeded in destroying the defensive galleries of the defenders, and o overthrowing the battlements, even in buring the wooden works by covering them with incendiary projectiles, then during the night the cat left its corridor; it was rolled over the terrace

and fascines to the foot of the curtain, and the miners attacked that - The besieged had no other resource but to countermine or to prepare in the rear for the men from the mine gallery or the breach, if the miners overturned a part of the wall.

Note 1.p.408. Art. Engin, Figs. 9, 10.

Assuming that we have to follow these different operations on the ground (Fig. 7), at A is drawn the curtain attacked, flanked by two towers spaced 164 ft. apart. At B is the ditch. The besiegers have reached C by the trenches n. They have commenced to erect there the fort E. Since it is necessary to hasten in such a case, this work is erected in stories, employing only short timbers, easily handled. [2] At G is represented an angle of the fort as begun. Great piles 9.8 to 13.1 ft long are driven in the earth and connected by horizontals g and by braces B A. Between this sort of frames are fastened the wicker panels H, likewise fixed in the earth. When the entire front portion I (opposite the enemy) is thus established, earth is brought in o the enclosed space, with branches and fascines; then is erected a second series of piles and hurdles b; they continued to fill it with earth. As the work advanced in front it is completed in the rear, and it is carried to the desired height, as well as the ramp K, that led to the upper part. On this platform are placed strong planks, then the battery of stone-throwers intended to destroy the defenses of t the towers. To batter the machines of the besieged V, a small platform is assumed to be established at L. The cat is brought in the gallery arranged under the fort. Well sheltered, it could await the moment when it was movet at O' into the ditch over the filling thrown from its front end. A cavalier view (Fig. 8), we bilieve, will fully illustrate the entirety of these works, that could only be executed by many men and quite slowly. For weeks levied men were occupied in felling and hauling logs, making hurdles, twisting ropes and riving planks. The military chiefs generally gave out these works by contract, as we have seen above, and those contractors had the name of plebians (roturiers).

Note 2.p.408. This method was already adopted by the Romans.

But an enterprise such as the siege of an important strong place was long and costly; the defense from the middle of the 12 th until the middle of the 14 th centuries evidently retained

a superiority over the attack. Until that last epoch, the system of attack of places was not modified in any sensible manner. The times of the great sieges had passed in France, and the two battles of Crecy and of Poitiers were fought in the open country. But under Charles V, Bertrand du Guesclin no l longer adhered to traditeons, and like all great captains, ad adopted a system of attack new at tha time, and that obtained for him surprising results. Du Guesclin cast aside the slow means that discouraged the troops and required a considerable equipment, excavators, enormous supplies of timbers, cartage difficult in the provinces where roads were scarce and bad. Thanks to his quick eye, his personal bravery, the confidence of his devoted and hardened troops, in great part composed of travelers accustomed to fatigue, he did not trouble himself to systematically invest places; he presented himself at the point that he kneu how to choose, erected his machines, attacked the approaches furiously, drove his sword into the loins of the besieged, and without giving them time to recover themselves, wearied and confused them by successive assaults, whhile he covered the ramparts by a rain of projectiles. Sometimes he took cities by bold strokes.

At the head of the men of Guingamp, he presented himself b before the castle of Pestien, a very strong and well equipped place. He comes straight to the bailey, has the castellan called and summons him to surrender. The castellan jeers at him and replies that he could not yield so strong a place, and th that he could hold out for a year.

"Castellan," says Bertrand, "you will be taken within three days in spite of what you do."

Note 1.p.411. Chronique de Bertran du Guesclin, by Cuvelier, a troubadour of the 14 th century. Verse 3097 et seq. (Coll. des docs. ined. sur l'hist. de France).

At dawn of the next day all is prepared in the camp of du Guesclin to attack. The crossbow men are covered by their shields, are ordered before the lists. In a forest near the place are concentrated 1000 levied men with 100 harnessed carts to prepare the necessary machines and to transport them to the point indicated. Near to the ditches advance the crossbow men, who commence a constant fire against the battlements. Ladders brought from Guingamp are arranged behind the lines of crossbow

men.

On the other hand, the men of the castle do not remain idle. At twenty places on the upper defensive galleries, they place casks and barrels filled with earth and stones, lumps of caustic lime. [1]

Note 1.p.412. They must collect a great abundance of hard stones and boulders, and place a great quantity on the walls of towers, and fill several vessels with lime; and when the enemies approach, these vessels must be thrown from the walls and scatter that lime, which enters the eyes of the assailants, thus blinding them." (Christine of Pisa, Chapter 38).

Bertrand is present everywhere and encourages his men to h hold on:- old French poem. [2]

Note 2.p.412. Chron. de Bert. du Guesc. Verse 3133 et seq.

He faces the defenses of the bailey before him. The men then bring ladders, the archers and the crossbow men of the besiegers redouble their fire; none could show himself between the merlons without being struck. [3] The citizens of Guingamp fill the ditches with fascines. The armed soldiers throw themselves on the ladders for the assault, having fastened to their heads large and ribbed shields.

Note 3.p.412. The same old French poem.

At the same time Bertrand causes to be burned and overthrown the gate of the little castle, [4] forces that first entrance, and presents on the road that leads from that first entrance to the gate of the castle, whose portcullis is lowered. On that road are found defenders. Bertrand causes 20 crossbow men to advance together and cover his men. These advance with their ladders and plant them against the defenses of the gate; armed men attack the remainder of the defenders of the little castle. Fifty soldiers have already gained the battlements, and a squire of Normandy addresses du Guesclin:-- "Sire, your pennon, I beg you for God's sake!"

Note 4.p.412. The same old French poem.

He plants it on the parapet. The portcullis is raised, and the assailants hasten under the gate. [1] But the castellan in despair throws himself with some men against the men of Bertrand, and kills several; then perceiving a cart, he has it rolled across the passage. Called by a soldier before Bertrand, he surrenders the place. This is not the sole occasion when

du Guesclin employs these expeditious procedures to obtain p possession of a fortress, which did not prevent him elsewhere from collecting with rare foresight everything necessary to make a regular siege. We even see that in attacking the castle of Pestien [2] by scaling and brute force, he took care to add to his army corps 100 carts and 1000 laborers, and that he employed an entire night in cutting trees and preparing ma machines.

Note 1.p.413. It is necessary to make a statement. The troubadour Cuvelier calls the portcullis a "barbaquenne." Old French poem.

It is known that the word "barbacane"is habitually applied to an advanced work serving to cover a gate. Here can be no doubt concerning the signification given to that word by the poet; it is a portcullis and not a drawbridge. When the scaling succeeded, the soldiers of Bertrand drew the "barbaquenne"contrarywise, which signifies that they did not raise the drawbridge, being in the city, to prevent their companions from entering; and the defenders with the castellan at their head, did not throw themselves before the assailants, seeing the drawbridge raised, since this bridge being raised, would have separated them. Therefore a portcullis was concerned here. Is the word "barbaquenne" applied to a portcullis earlier than the same word is used for an advanced work? Is i later than that? That is what we cannot decide. The word barbican applied to an external work is employed from the 12 th century. (See Glossary of Ducange.

Note 2.p.413. Now Pestivien, 15.8 miles from Guingamp.

At the siege of Meulan, du Guesclin boldly takes possession of the bailey and the advanced works without preparatory works, and he forces the garrison to retire into the keep that commands the bridge over the Seine. The soldiers of Bertrand cannot take it by brute force. Orders are given to mine that tower. The miners have with them guards to defend them at need, if the besieged discover the mine; but these precautions are so well taken, and the earth is removed with such precautions, that the garrison has no knowledge of the subterranean work. [3] The mine is finally vacated and shored with greased wood; fire is set to it, and half the tower "falls on the front."

Note 3.p.413. Chron. de Bert. du Guesc. Verse 4012 et seq.

It is evident that in the eyes of the soldiers of his time, du Guesclin, who paid little attention to routine and who took in 24 hours places tha it was assumed could be held for several months, was one that spoils the trade (pardon the word). It was said by the old general of the coalition about the officers of the republican armies; "one does not fight like that

It was not alone hostile commanders, that saw in du Guesclin a captain spoiling the art of war, his brothers in arms also manifested that opinion. But du Guesclin by his freedom, shrewdness and loyalty, and especially his striking successes, took away from those mistrusts all they could have injurious. The nobility at that epoch was not dominated by the jealous vanity, that was later so prejudicial to the kingdom of France At need it could recognize the superiority of a chief endowed with true genius, and subject itself to his authority. Besides, the skilful captain, who knew how to await his hour, very quickly takes the place due to his genius. Entirely a knight, and as good a knight as he was, du Guesclin struck as hard a blow on chivalry, already much depressed, as to the fortresses that served it for refuge.

It suffices to see how was led the little army, that gained the battle of Cocherel, to recognize the military superiority of du Guesclin. Although Charles V was scarcely king and not yet crowned, had named him marshal for "li" after the death of king John, this was not a title to give him serious authority over the gentlemen who composed his little army, and among which were counted great lords, like the count of Auxerre. T Thus having scarcely entered on the campaign to oppose the march of the captal du Buch, who having collected his troops at Evreux, intended to surprise the young king at Rheims during his coronation, the chiefs of the army of du Guesclin posed as advisers. Godfrey d'Anequin gave his, then the lord de Beaumont. [1] Du Guesclin, who followed the rear guard, allowed h himself to say; that if they marched across the route of the captal, the rest mattered little. He adhered strongly to concealing his march. (Old French poem).

Note 1.p.414. Chron. du Guesc. Verse 4145 et seq.

According to Froissart, the captal inquired of the march of the French of a herald of arms, that he met on his route. The herald replied that they had a great desire to meet him, that

they had already taken the bridge of Arche and Vernon and must be near Pacy. [2] The troubadour Cuvelier does not mention this fact; better informed of what occurred in the French army, than of the acts of the army of the captal, he presents the troops of du Guesclin as sending couriers in advance who discover nothing. But Bertrand, [2] arrived at Cocherel and having crossed the Eure wit his men, in spite of the negative report of the couriers, shows himself that time as a commander, and says to the scouts:- "you are only good to pillage on the great r roads; if I had gone myself, I should indeed have known how to find the English. This is their route, they will pass here, and we will await them." In fact the English soon presented themselves on the bank near Jouy.

Note 2.p.414. Chron de Froissart. Book I. part 2. chap.165.

Note 3.p.414. The narrative of the troubadour Cuvelier seems more explicit concerning the army of du Guesclin, than that of Froissart. In fact du Guesclin on leaving Rouen to go to meet the captal on the road of Evreux must pass the bridge of Arche and Vernon, but had not to go as far as Pacy, since he halts his troops at Cocherel and crosses the Eure at that point.

The army of du Guesclin then found itself posted in the bottoms, that are about 1020 ft. wide between the Eure and the very steep hills bordering the left bank of that river. The French had this at their backs and were masters of the bridge leading to the village of Cocherel; on the hills were trees, on the slopes being hedges. The army of the captal thus found itself in a position that could not be attacked. To descend into the plain and attack the men of du Guesclin was not a maneuvre, for on examining the localities, it was recognized that between the meadows occupied by the French and the hill, there was a depression and some natural valleys. For two days and nights the armies watched each other. Du Guesclin opposed every attack of the captal likewise on his part. But battle array was well prepared on both sides, and everyone remained at his post. In the second night Bertrand collected the lords: "At dawn," says he, "let us take our equipment and baggage to the other bank of the Eure, well arranging ourselves for battle, and we will accompany them along the flanks and cover t their rear, as if we were in retreat. Seeing us turn our backs and ready o pass a river, the English cannot resist the desir

of attacking us and will descend the mountain. Then allowing all the baggage and servants to proceed, we will face to the rear and throw ourselves on the men of Navarre and the English fatigued by a long march." [1] Matters occur thus as du Guesclin had foreseen; but it was an affair with a strong party, and t the men of the captal strongly sustained the attack. Then a troop of 200 lances is detached from the army of the French, turns toward the mountain and is concealed by the shrubbery, and then having pierced the hedges, it throws itself on the rear of the captal. This maneuver decides the day. [2]

Note 1.p.415. (old French poem). Thes passage is curious; it required a captain of the temper of du Guesclin to be able to impose ongiven order distinctly on an army composed in great part of lords, more disposed to follow their own fancies than the commands of a chief.

Note 2.p.415. Froissart relates a little differently the r result of the battle of Cocherel. He speaks indeed of the t turning movement, but he claims that during the fight the captal was taken by a troop of Gascons of the French army, that were sworn to that purpose. This is a little romantic, but Froissart voluntarily collects information favorable to the English. This kind of plot, that decides the gain of the day, further leaves to the captal of Buch his part of great captain According to Froissart, he is first led to attack the French by the order of his officers, who do not listen to his prudent counsels, then he is captured during the action, which so to speak, relieves him of all responsibility for the defeat of Cocherel.

When one compares this battle with the unfortunate affairs of Crecy, Poitiers and Azincourt, one perceives the hand of a true captain, prudent and knowing how to wait, economizing his means, but hesitating no longer in the moment of action.

It was by that foresight before the action and that decision at the supreme moment, that du Guesclin took such a great number of strong places in so little time. But also these successes, apparently so easy, caused the system of defense to be modified. Greater height was given to the works anf chiefly to the curtains; the ditches were made wider, the walls of t the towers were crowned by continuous machilocations of stone, that made scaling impossible. The external works were sensibly

increased by giving them greater extent and more flankings. Then artillery commenced to play a part in sieges, and without diminishing the commanding heights and even increasing the around strong places were laid out earthworks to place the g cannon. [1] In 1378 the English besieging S. Malo had 400 guns, says Froissart. [2] Still these cannon (admitting that Froissar intended to designate guns by that word) were only of small calibre, giving only a parabolic flight, for they could only throw projectiles into the city, without attempting to make a breach. The commander in chief of the English army, the duk of Lancaster, seeing that he did not advance his work with t that quantity of cannon, and that the assaults could not succeed, took up the method of mining. "The miners of the duke of Lancaster worked carefully night and day in their mone to com underground into the city, and to overthrow a piece of the w wall, so that quite easily men at arms and archers could ente it. Morfonace (the French commander) suspected that matter s strongly, and the knights that were inside, and knew well tha by this mode they could be lost; and they cared for no assaul but that; for their city was well provided with artillery and provisions for keeping them two years, if necessary. And they had a great care and purpose that they should stop that mine; they thought of it and labored so that they attained their a aim, and by a great chance, as if several things occurred at the same time. Count Richard of Arundel must make the watch one night with a number of his men. This count was not very careful to do what he was ordered, and those of S. Malo knew as much, whether by their spies or otherwise. Then they felt that the hour had come, and that trusting to the watch, the entire host was sleeping, they secretly left the city, and came under cover to the place where the miners worked, who had little more to do to complete their undertaking. Morfonace and his men, all prepared to do what they had come there for, at their ease and without defense broke up the mine, so that no miners within it could leave it, for the mine fell in on them." [1]

Note 1.p.416. After 1340 cannon in fixed positions were mounted around strong places. "They came (the French) before Quesnoy, and approached the city even to the barriers, and made a feint of attacking it; but it was so well provided with

good men at arms and great artillery, that they lost their pains. Yet they skirmished a little before the barriers, but we were compelled to retreat; for the men of du Quesnoy fired cannon and lombards that threw great stones." (Froissart, Book I. Part I. Chapter 111).

Note 1.p.417. Froissart. Book II. Chapter 35.

The mine with shores to be set on fire was long employed even after the use of gunpowder. The idea of using powder as a means of making a breach or of blowing up works only came much later, about the middle of the 15 th century. In the work of Francesco di Giorgio Martini, Sienese architect born about 1435 and died about 1480, there is mention of mines with the use of gunpowder. Plans indicate the means of placing chambers, arranging the galleries and the fuses. [2] As for machines with counterpoises, trebuchets, mangonels and stone-throwers, they were employed together with cannon about the end of the 14 th and beginning of the 15 th centuries. In the sieges at the end of the 14 th century, Froissart often mentions casting machines, whose effects were much more disastrous than those produced by guns of small calibre. [3] Men otherwise did not cease to improve machines, as if cannon could only be good to replace the great crossbows with windlasses.

Note 2.p.417. See the edition of this curious work first published at Turin in 1841, Trattato di arch.civ.et milit. etc 2 vols. of text with atlas.

Note 3.p.417. It is necessary to state that du Geusclin does not seem to have had cannon, either for defense or for the attack of places. It would appear that those imperfect engines did not inspire him with any confidence.

To take the city of Bergerac, the French in 1377 sent to Reole for a great war machine called the "sow", "which machine was of such arrangement, that it cast stones of burden; and several hundred men could place themselves within, and assail the city on approaching it." [1] So this machine was at once a movable tower, a cat and a stone-thrower. Mounted on a frame and rollers, it threw stones against the hostile ramparts while approaching the foot of the walls; it did not need to be supported by mangonels in position, and when it reached the rampart, the soldiers that filled it threw themselves on the parapet, and at the same time sapped the base of the wall.

"On the morrow the sow that they had brought, was moved the nearest possible to Bergerac, which greatly amazed the men of Bergerac."

Note 1.p.418. Froissort. Book II. Chapter 5.

Note 2.p.418. Froissort. Book II. Chapter 7. -- Christine of Piso in the Livre des fois etc. describes this sort of machin (Chopter 35). Old French text.

Already in 1369 the English hauled about with them artillery employed in sieges, while still using great machines. "So they did so much (the English) that they came before the castle of Roche-sur-Yonne, which was fine and strong, well guarded and well provided with good supplies of artillery. Thus one was captain on the part of the duke of Anjou, a knight called Sir Jean Blondeau, and who had under him at the said castle many good, companions at the cost of the said duke. So the aforesaid lords (English) and barons, who were there, arranged their siege in a good and grand manner; and invested it entirely, for there were many men for this, and they caused to be hauled from the cities of Thouars and Poitiers great machines, and erected them before the fortress, and also some cannon t that they long had wit their host, and were accustomed to carry."[3]

Note 3.p.418. Froissort. Book I. Chopter 280.

The improvement of this artillery, which allowed them to b batter the tops of the defenses at quite a long distance, had gradually led the constructors of strong places to extend the outworks, and even to make them of earth to better resist projectiles. Christine of Pisa already indicates embankments as necessary for the good defense of places.[4] At the beginning of the war under under Charles VI, in sieges is no longer a question of portable towers, and those great machines whose use was so uncertain. Places were invested, the besiegers buil forts around them and traced enclosing ditches; commenced to establish banks equipped with cannon and even yet with counterpoise machines, crossbows with windlasses, attempting to mak a breach, and tried to asrault when they could ruin a piece of the wall; or they made branched trenches, filled the ditches and employed mining. The siege of Melun described by J. Juvenal des Ursins,[4] indicates these different operations. The k king of England and the duke of Burgundy came to besiege the

city of Melun and completely invested it. [2] It is defended by by the lord Barbazan, brave gentlemen and a devoted people. The English trace their enclosing double lines; they fortify with palisades and ditches the forts erected at certain distances. "Thus at both sides are arranged lombards and cannons, that begin to shoot strongly against the walls into the city; the companions inside on the other hand also likewise fired with great courage cannon and crossbows, and several were killed."

Note 4.p.418. Christine of Piso. Chapter 35.

Note 1.p.419. In 1420. -- Hist. de Charles VI.

Note 2.p.419. Item. "King Henry enclosed his host all around by good ditches, and had only four entrances to it, where he had good barriers, that were guarded at night; by which one could not surprise the host of king Henry." (1420). (Memoires of Pierre de Fenin).

At various points the English succeeded in making a breach and parts of the walls had fallen into the ditches. Yet the king of England always refused to order the assaulta When a German nobleman of Bavaria arrived in the meantime, and placed himself on the side of the Burgundians. "He marvelled much that they had not attacked the city, and spoke of it to the duke of Burgundy, who replied to him, that it had been mentioned several times, but that the king of England was not of that opinion."

But the Bavarian duke obtained from the kink that the assault should be made. They brought abundance of ladders and of fascines to fill the ditch. Barbazon allowed the assailants to descend into the ditch and gather at one point, and then he caused to appear a great company of brave men on the ruined ramparts, who covered the assailants with projectiles, while he took them in flank by a troop secretly coming from a postern pierced at the level of the bottom of the ditch. The Burgundians and the Germans retreated, not without leaving m many of their men, for while they sought to ascend along the counterscarp, crossbow men appearing suddenly on the tops of the walls shot many bolts at them.

The besiegers then began to mine, since they could not take the place by main strength. "Which was much suspected by those inside; for which cause they diligently listened in cellars,

whether they heard anything, and if they did not hear one striking on the stones, or some noise or sound. In fact in a cell near the rampart, Louis Juvenal des Ursins heard the work of the miners; he armed himself with an axe and went to the place where he supposed the miners would enter. "Louis, where are you going?" demanded Barbazon. "To oppose the miners." -- "Brother, you do not yet know well what mines are, and to fight there, give me your axe." "And he caused the handle to be cut quite short, for the mines often bend and are narrow, which is why short handles are necessary, he came there with other knights and squires, who perceived that the mines of their enemies were near, so that they hastily made a sort of barrier and other arrangements and instruments to resist entrance; and because the said lord saw the desire of the said Louis, he desired him to be first to take arms into the said mine; those inside the city themselves sent for laborers to countermine, who had torches and lanterns like the others. When those within had countermined about two fathoms, it seemed to them that t ey were near the others; so good and strong barriers were made and fixed; also the others appeared that were countermined, so that when they met each other, then the companion laborers retired at each side."

A series of singular combats occurred at the mouth of the mine. A bar is placed across, and the men at arms defied and fought with side arms from each side of the bar. The king of England and the principal lords came to assist at that sort of tourney, praised the conquerors and make several knights. "And (the king of England) praised the valor of those within, that if they only had provisions, would never have surrendered

These jousts at the end of a mine gallery are not war, and this curious episode shows how for the feudal nobility, the matter was not so much to free the kingdom from foreign domination, as to acquire the fame of brave knights and to take part in fine "feats of arms." Besiegers and besieged know each other and live together after the combat. When the city of Melun was surrendered, some of the defenders escaped," any that saw a way, and the others had friends and acquaintances on the side of the Burgundians. Now while they expected to go away simply with a staff in their hands," they were cast into the dungeons of the lowest ditch at the fort S. Antone and at

the little castle. These had no friends in the camp of the besiegers, but they had bravely fought for the party of the dauphin, who had abandoned them.

During that gloomy period the war by sieges did not exist for the French. All resolved into jousts and shameful bargains. The lords took sides, sometimes for the duke of Burgundy and sometimes for the dauphin, according as then thought to find glory or profit. Or again at the head of some men at arms, they remained in the country and pillaged it, caring little whether the people were Burgundians or Armagnacs. On the contrary, the English and Burgundians had well equipped and provisioned armies. They took cities and castles, either by main force or at the end of sieges pursued with persistence. This was no longer the time of the good constable du Geusclin, who knew so well how to maintain discipline in his troops and permitted no negligence. Also who could have confidence in these starweling and arrogant lords, no longer submitting to the h hard life of the camps, occupied with their own welfare and in making acquaintances in all parties, ruining the country that they ought to protect, always ready to betray or at least to abandon an undertaking?

"What shall I then say of us?", writes master Alain Chartier, and what hope could I have in our enterprises and armies, in that the discipline of chivalrw and strict justice of arms a are not maintained? Nothing else can be said, except that in this case we go like a ship without rudder or a horse without bridle, for each one desires to be a master of the trade, to which we still have few apprentices. All can scarcely endure to burden themselves with war or the enemies, but everyone d desires to form a company and be a chief by himself. And there are so many captains and masters, that one can scarcely find companions or servants. Now to know how to gird on the sword and put on the hauberk suffices to make a new captain. Then it occurs that enterprises are undertaken or sieges laid, or the ban of the princi is cried, and the day is often set to hold the field. But several came there for form, more than in doubt to fail there; and fearing to have shame and rather than to wish to do well. And if it be in their choice to come early or late, to return or remain. And there are such, that love the ease of their houses more than the honor of the nobility

to which they belong, that ween compelled to appear, they voluntarily bring with them; like snails that always carry their shells where they feed. This ignorance or fault of the heart has caused theft and rapine, of which the people complain. For in default of those which should help, it is necessary to take those that can be found, and to make war with men collected by gifts and by prayers, instead of those who owe this, and loyalty called them to it. Thus the war made by men without land and without homes or the greater part, which necessity compels to live on others; and our needs have required us to suffer this. And when the valian leaders, whom the mercy of God has again tried in this kingdom, take the trouble to lead into the field the nobles for any benefit, they delay so long to leave well equipped, and they undertake so soon to return voulntarily, that nothing can scarcely be commenced; but with greater trouble to undertake to complete it. For with the little good will of some is found frequently suc great arrogance, that those who can do nothing themselves will not bear arms under others; and they hold it dishonor to be subject to them, under whom might come to them fame and honor, w which they of themselves would not acquire."

Note 1.p.421. Le Quadrilogue invectif, edition of Anche Duchesne. 1617. Alain Chartier was secretary of kings Charles VI and Charles VII.

This gloomy picture is no overcharged, but it is only one side of those times of miseries. Behind that nonchalant and egotistic nobility, that no longer knew how to bear arms except in tourneys, the people of the cities commenced to resume a marked predominance. There was only lacking to them a chief, only a standard around which they could gather. Joan of Arc was for one instant as the incarnate inspiration of these peoples at the end of their patience and claiming to resume in their own hands their affairs so miserably conducted by feudalism. In them arose the idea of the country and of nationality, and soon furnished a solid support for royalty. The siege of Orleans in 1428 marks the beginning of this new era, and this military feat closes, so to speak, the series of warlike undertakings of feudalism.

It was on Oct. 12 th that the English army presented itself

It was on Oct. 12 th that the English army presented itself before Orleans by Sologne. Lord de Goncourt was governor of the city. Some knights shut themselves up there at the first news of the danger menacing them; these were the lord of Villars, captain of Montargis; Mathias, an Arragonese; the lords of Guitry and of Corraze, Xaintrailles and Poton his brother; Pierre de la Chapelle, de la Beance, etc. Dunois, the Bastard of Orleans, arrived on Oct. 25 th; with him the lord of S. Severe and the lord of Breuil; lord Jacques de Chabannes, seneschal of Bourbonnais; the lord of Gaumont-sur-Loire; a Lombard knight, theaulde of Valpergne; a Gascon captain, etienne of Vignole, called la Hire. The importance of the place would have called a much greater number of knights, but many preferred to remain at the court of the dauphin, who had taken refuge at the castle of Loches, and who seemed to await there what fate should decide for his crown.

The inhabitants were determined to defend themselves. The attorneys of the city proposed to the citizens an extra tax; many gave more than their tax. The chapter of the cathedral contributed 200 crowns of gold. [1] But a more remarkable fact indicates the tendencies of the cities of France at that unfortunate epoch. Orleans passed as the key of the southern provinces, and many municipilaties sent there aid in money and in kind; Poitiers and Rochelle gave considerable sums; [2] Albi, Montpelier, the communes of Auvergne and of Bourbonnais, Bourges, Tours and Angers, sent to Orleans sulphur, salpetre, steel, crossbows, [1] lead, provisions, oil, leather, etc.

Note 1.p.422. Symphorion Guyon. Vol. II. p. 188.

Note 2.p.422. Comptes de la commune. Poitiers, 900 livres tournois; Rochelle, 500 livres tournois.

Note 1.p.423. Comptes de la commune. The city of Montpellier send in 1427 to Orleans four great crossbows of steel, each weighing 100.lbs. They received from Auvergne and from Bourbonnais 188 bells (souores) of steel for making crossbows.

After 1410 Orleans prepared itself in foresight of the possibility of war. Dating from about that epoch the accounts of the city are divided into expenses of the commune and expenses of the fortress. The attorneys, [2] chosen by the inhabitants, were charged with the management of these funds, and it must be recognized, that this municipal administration proceeded

that they held the key to half the kingdom, having on their h hands not only foreign troops but also the militia of the neighboring cities, they listened only to the voice of patriotism, and without hesitation mounted on their ramparts, well equipped by their care; when we see that, we shall somewhat be tempted to say, "restore us to those middle ages, that could produce such men and give them such sentiments, and particularly before covering them with scorn, let us do as well on occasion."

Note 2.p.423. Later the attorneys (procureurs or procurators) were designated by the name of aldermen.(Echivins).

From 1410, we will say, the attorneys of the city of Orleans cause to be repaired the walls and the tower of the gate Burgundy; [1] The city already possessed cannon. In 1412 barriers to the number of 15 are established before the gates of the c city. Those barriers were of wood, arranged so as to lodge t the gate-keepers and watchmen.

Note 1.p.424. See memoire sur les defenses fait par les Orleanois, etc. by Vergnaud-Romagnesi. Aubry. 1861.

In 1415 after the battle of Agincourt, the city is pu into a state of defense. About that epoch, the city was divided into eight quarters. "Each quarter had its chief, who commanded 10 tithingmen. The latter received reports of the chiefs of streets. The chiefs of streets were charged with policing, and at the first call must collect their men at one end of the st- street. In 1417 the enclosing walls of the city were likewise divided into six parts, each with a chief of the guard, who had under his orders five tithingmen.and fifty inhabitants. That was renewed daily by one sixth. In that same year a part of the slots in the towers was converted into embrasures for placing cannon. "From that moment men thought to have made a and put in condition the great shields of the city. They were 3.5 ft. high," were made of thin boards banded at the bottom and covered with leather; "straps served for passing the arms through the back in mounting to the assault."

Ramparts were arranged before the gates and outside the barriers. These ramparts were earthworks with sharpende piles a fathom in length, placed almost horizontally above the ditch on the scarp. Thise piles were connected to timbers by planks. In 1428 the ramparts were raised (their height was 11 ft.),

fitted with terraces with parapets and embrasures of fascines or of stone.

From 1417 a house inspection was made by 18 commissioners (4 attorneys of the city, 4 notaries, 4 citizens, 4 sergeants and two persons not designated), and this must state if each inhabitant was provided with the military equipment required by the regulations of the city.[1] About the end of this year of 1417, the prince of Vertus, brother of the duke of Orleans, then prisoner in England, came to inspect the terraced works.

Note 1.p.425. This military equipment consisted of the coat girded by a leather belt, or with fastenings of leather called "orties;" of the bassinet (helmet of polished iron without a visor or gorget); bows, crossbows, swords, "ouisarmes," bottle axes, "pics," and lead hammers. The city caused to be made at this epoch 96 slings with sticks, and in 1418, 1000 arrow heads and strong crossbows.

In 1418 new mortars and cannon were tested outside the city, and hard stone was brought for turning into balls.[2]

Note 2.p.425. The stonecutters delivered 422 of these balls, that weighed from 4 to 64 lbs.

In 1419 chains are regularly stretched every night in the streets of the city, by means of windlasses placed in the ground stories of the houses. Alarm bells are placed on the gates, and the watchmen receive trumpets. A test is made of a great stone-thrower placed on the bridge opposite the little castle. The low posterns (beneath the drawbridge) are pu in condition. Jean Martin, articcerist, furnishes eight steel crossbows, each to be handled by four men. Wooden stairs are arranged for ascending frsc the city to the defensive galleries of the curtains.

In 1420 on the bank of the Loire, the ramparts had no parapets; machines were placed there with covered parapets.

In 1422 the inhabitants, under penalty of fine, are held to come to work in the ditches; the fines produce 500 livres.

In 1428 the ditches are again made deeper and wider. (They are 40 ft. wide and 20 ft. deep). Other old portions of the ramparts are furnished with wooden mantlets with strong posts fixed in the masonry.

In the month of September of the same year, the census ordered by the commandant of the city shows that the number of the

men in condition to bear arms amounts to 5000. The inhabitants are requested to furnish themselves with provisions. The suburbs are demolished to a distance of 109 fathoms (655 ft.) f from the ramparts. The inhabitants voluntarily impose this on themselves, and they set fire to the suburb of Portereaux situated on the left bank of the Loire before the bridgehead. They strengthen the rampart of Tournelles. On Sept. 25 th a great cannon is cast by Jehan Duisy; placed in battery, its balls compel the English, who had begun to camp on the right bank downstream, to retire toward S. Laurent. A powder factory is established in Rue des Hotelleries. Jehan Courroyer is appointed chief of the cannoneers..

For the knowledge of what followed, it is necessary to present here the plan of the city of Orleans with its walls in the 15 th century and its vicinity. (Fig. 9). The english army then presented itself, as we have stated, on Oct. 12 th, 1428, before the bridgehead of Orleans on the side next Sologne. The houses of the suburb of Portereaux and the monastery of the Augustines located at A had been destroyed by the inhabitants, so that the enemy could not lodge there. The English directed their attacks against the little fort of Tournelles B.[1] and the parapet that covered it.[1] After three days of attacks, unable to hold the fort longer, the Orleans men abandoned and burnt it, cutting an arch of the bridge at C. They fortified themselves in the little fort of Belle-Croix built hastily of wood on the bridge itself; and in the fort S. Antoine situated at D.[2] The English repaired the fort of Tournelles,[3] where their commander, the count of Salisbury, was slain by a stone ball shot from the tower of Notre Dame at E.[4] Not finding themselves sufficiently in force to continue the siege, on Nov. 8 th they retired toward Jargeau and Beaugency, contenting themselves with leaving a garrison in the fort of Tournelles. The Orleans men profited by that respite; they d destroyed all the edifices and houses of the suburbs on the right bank; churches, monasteries, mansions, all were burned and razed, so as to leave outside the walls only an empty and cleared space. Meanwhile the English garrison of the fort of Tournelles had received mortars, and threw into the city projectiles weighing as much as 192 lbs. Two great guns placed in battery at the postern of Chesneau at F, and a culverin

mounted on the rampart of Belle-Croix, caused serious damages to the English; the two cannon of the postern of Chesneau threw stone balls of 120 lbs.

Note 1.p.428. Art. Pont.

Note 2.p.428. For all details of the siege, see Journal du siege d'Orleans, the process de condemnation of Jeanne d'Arc with notes, etc., published by J. Quicherat (Vol. IV, p. 94), the Histoire du siege d'Orleans, by M. Jollois (Paris. 1833). From the beginning of the siege the people of Orleans took part in the defense. At the attack on the rampart of Tournelles, the Journal du siege cites the French knights that distinguished themselves; it adds, "Likewise there was great assistance made by the women of Orleans; for they did not cease to carry very diligently to those defending the rampart several necessary things, like boiling water, oil and grease, lime, cinders and caltrops."

Note 3.p.428. "That same day of Sunday that the Tournelles was lost, the French within the city broke down another very strong rampart. And on the other hand the English broke down two arches of the bridge before the Tournelles, after they had taken them, and built there a very great rampart of earth and great fagots.

Note 4.p.428. Distant 1708 ft.

On Dec. 30 th, the English returned in force [5] from the Beaugency side, took possession of the ruins of church S. Laurent (see at G) after a very lively combat, and fortified themselves there. During the entire duration of the siege the great fort of S. Laurent was the headquarters of the army of t the besiegers. On Jan. 6 th, they had erected the fort of Charlemagne at H on the island of that name, and the rampart of S. Prive at I, so as to command the course of the river below and to aid the garrison of the Tournelles. Yet the Orleans men did not allow their city to be invested without fighting. Each day was marked by sorties and undertakings, either to fight the English parties or to disperse their laborers.

Note 5.p.428. Their army during the siege was from 10,000 to 11,000 men. The Orleans forces were nearly equal about the end of January, 1429.

During the months of February, March and April, the English extended their investment. They built successively on the right

bank the forts of Croix-Boissie at K; of the 12 stones or of London at L; of the Pressoir des Ars at M; between S. Ladre and S. Pouair at N on the road to Paris. Above on the Loire on the right bank at the end of the island S. Loup S L, and commanding the Roman road from Autun to Paris, they erected a g great fort. Then on the left bank a O above the fort of Tournelles on April 20, they finished a last fort called S. Jean le Blanc. Thus the Orleanists only with great difficulty could receive aid through the country in the direction P, between the road to Autun and that to Paris.

Owing to the incomplete investment, [1] on April 29 Joan of Arc could enter the city with a convoy of provisions and munitions from Blois. This convoy had passed by Sologne and crossed the Loire opposite the port of Chessy, situated about 1.25 miles above Orleans. Thence it marched by Boigny and Fleury and entered Orleans by the gate S. Aignan at R. Everyone knows how eight days after the arrival of the Maid, the English were compelled to raise the siege; their demoralized troops dared not leave their forts. It was in fact no longer for them to fight soldiers, but an entire people filled with rage, and throwing itself blindly against obstacles. After three days of fighting, the English are obliged to abandon their forts on t the left bank, they lose the rampart of the fort of Tournelles, and the besiegers became the besieged in the works, that they had erected on the right bank. Henceforth the people entered the lists, and the part of the feudal armies lessened daily.

Note 1.p.428. It is necessary to recognize that the English, who never had over 11,000 men before Orleans, could not entirely close the vicinity. Besides in the presence of the besieged that made daily sorties, they were obliged to leave many men in the forts. Some enclosing ditches that they had attempted to excavate had been filled by the Orleanists.

We have seen that at Toulouse at the beginning of the 13 th century, it is the people of the city that resist the troops of Simon de Montfort, and that the municipality organizes the defense. Until the siege of Orleans, on the soil of France a appears no similar fact. One easily understands that this awakening of the city peoples must excite astonishment and even wrath of feudalism. For the French knights, Joan was at least an embarrassment; she addressed the people, and she aroused the

people to the defense of the territory. For the English people the Maid was an instigator of revolts, a revolutionist. They felt all the gravity of that new influence, that aroused the people in the name of the defense of the soil. She was condemned in the name of that political reason, that always believes that with torture and proscription may be stifled new opinions. The English were not the most culpable in that shameful procedure, over which presided the bishop of Beauvais, but indeed the nobility and clergy of France, who saw in that strange girl the soul of the people rising at last, in opposition to the odious bargains, that ruined the country and lost the kingdom.

Note 1.p.429. "Very high and very powerful prince and our much feared and revered lord, we very humbly recommend ourselves to your noble highness. How that formerly, our much feared and revered lord, we have written to your highness and supplicated very humbly, that by the mercy of God the woman called the Maid being in your power, was placed in the hands of the justice of the Church, to make her trial duly for the idolatrous and other matters concerning our holy faith, and to repair the shame on her account come on this realm; together with the damage and innumerable inconveniences, that have ensued; for in truth in the judgment of all good Catholics cognizant of this, such a great wound to the holy faith, such enormous danger, inconvenience and damage to all public affairs, of this kingdom, have not come in the memory of man, if as may be, she (the Maid) proceeded by such damnable ways, without proper r reparation; but in truth it is greatly to the injury to your honor and of the very Christian name of the House of France, of which you and your very noble ancestors have been and are constantly loyal protectors and very noble principal members." (Proces de condemnation of Joan of Arc, published by J Quicherot. Vol. I-- Lettre de l'universite de Paris au duc de Bourgogne, p. 8). -- The university of Paris in demanding the judgment and condemnation of Joan of Arc, acted in the name of conservative principles. In fact what would happen if a poor village maiden could with impunity cause herself to be followed by an entire people in the sole name of national independence, and thus destroy all the political combinations of French and English nobles for dividing the territory? But besides the

nonsencical style, of the captious interrogations addressed to the Maid by her judges, what grandeur and noble simplicity in her replies. Questioned if she did not say that the pennons resembling hers were theirs, replied, that she said to them at the time: enter boldly with me to the English, and she herself entered."

When the city of Orleans was taken, "so they (the English) hostily communicated these things to the duke John of Bedford, the regent, who was much grieved by them, and doubted that o anyone of those of Paris for that defeat could reduce to the obedience of the king and arouse the common people against t the English." The common people no longer paid attention to the customs of war; no more prisoners, it was necessary to e exterminate the foreigners. "Thus there (at the taking of Jorgeau) were taken prisoners William de la Pole, count of Suffolk John de la Pole, his brother; and the defeat of the English numbered about 500 combats, most of whom were slain, for the common people killed all the English prisoners in the hands of the nobles, that they had held to ransom.

Whereby it was proper to take to Orleans by night and on the river of Loire the count of Suffolk, his brother and other great English lords, to save their lives. (Chron. de la Pucelle Temoign. des chron. et hist. du 15e siecle. Proces de condem. et de rehabil. de Joanne d'Arc. Publisher J. Grimaud. Vol.IV).

Civil war in a permanent state had also placed arms in the hands of all. The pillaged peasants, the rustics without work and bread, in their turn took up brigandage, swept over the country and villages, placing at their head some noble ruined like them or some captain of soldiers. These companies devastated all the North and East of France, under the name of skinners, during the greater part of the reign of Charles VII, and formed a nucleus of troops in the pay of the king. When on June 1, 1444, a truce of 100 years was concluded between the French king and Henry VI, it would have been necessary either to disband these troops, which would have been a new plague for the kingdom, or to pay them for doing nothing, which the state of the finances of the king did not permit. To occupy them to advantage, the siege of Metz, a free city, was decided on for the most futile pretext. But the people of Metz possessed an entirely republican organization, and defen-

defended themselves so well, that after six months of blockade, for the city could not be attacked by main force, peace was c concluded for money. This was all that Charles VII asked.[1]

Note 1.p.430. See Siege de Metz en 1444, by MM de Soulcy o and Huguguenin, 8r. Metz. 1835.

This is what was the organization both civil and military of the city of Metz.

A president of the republic of Metz or master alderman, appointed on March 21 st of each year by the prinicier (head) of the city, the abbots of Gorze, S. Vincent, S. Arnould, S. Clement and S. Symphorien. The master alderman had in his hands the executive power; but as a sort of doge, his power was controled by the council of thirteen, which was especially charged with judicial functions. There was also the treasurer of the city, elected each year on the day of Candlemas. Military affairs were under the direction of seven elected chiefs. Seven other inhabitants had the oversight of the fortifications, gates and bridges, The receipt of taxes, matters of finance and of the municipality were in the hands of 21 m magistrates, seven for each purpose. They were 20 actual notaries.

But that republic of Metz was nowise democratic; like that of Venice, it had its patricians, comprising six associations of privileged families, designated by the name of "paraiges",[2] and gradually all elective offices devolved on the members of these six societies.

Note 2.p.430. We find a similar organization,a Toulouse in the 13 th century. (Croisade contre les Albigeois. Verse 5733 et seq. Old French poem.

The city maintained a permanent corps of horse and foot soldiers.[1] At the time of the siege in 1444, paid soldiers numbered 312, the hired crossbow men being much less numerous. Every citizen or rustic belonging to the patricians was required to take arms for the defense of the city. That militia was organized in companies by trades, and each company had a part of the wall with a tower to defend. The patricians must not only march in person to the defense of the city, but must furnish a fixed number of men at arms. The country inhabitants of the territory of the city found themselves in the same conditions imposed on the citizens and rustics.

Note 1.p.431. Mounted soldiers and infantry.

During the siege the master artillerists were 10 in number. At the approach of the trrops of the kings of France and of Sicily, the magistrates caused to be burned and razed the rich suburbs of the city, and they strongly supplied the place. To complete the investment of the city, the royal armies must besiege the castle, villages and hamlets of the territory of Metz, which took much time and hardened the people. This siege is also merely a series of combats, skirmishes and ambuscades, between the defenders and besiegers. The latter place some pieces in battery, send balls into the place, but make no works of approach and content themselves with closing the blockade to starve the city. It is probable that the kings undertook that war, one being Renee of Anjou, only not to return to the people of Metz the great sums lent him by them, the o other being Charles VII, only to support his companies of skinners without paying them, and to obtain a good sum of money for himself, not desiring to deliver the city of Metz to pillage; that would have been to kill the hen of the golden eggs. The resistance of the city of Metz, the details of its government during the siege, the order prevailing, the bravery of t the inhabitants, the good behavior of the militia, are no less one of the signs of the times.

In all the attacks and defenses of cities in the 15 th century, the citizens are charged with the artillery. Artillerists, culverin men, [2] make and serve the guns. Some own these new engines and with their pieces enter the service of their city.

Note 2.f.431. See Journal du siege d'Orleans, Attaque de Jorgeau, etc.

In the operations of the siege of Orleans, the English make no approaches; erect forts, attempt to unite them by a ditch; they leave those forts to combine their attacks, and take refuge there if pursued; but we do not see them excavate branched trenches to reach under cover the ramparts. Yet as one can see in the course of this Article, much before that epoch besieging armies made actual approaches. A little later the troops of the duke of Burgundy, when they besieged a place, passed to the ditches by means of trenches. "On July 16 (1453) the duke of Burgundy started from Courtrai; went before Gavre

and besieged it and surrounded it on all sides; and he unloaded cannon, mortars and flying engines; and the approaches were made as well as they could; in truth the place of Gavre was little equipped with guns or machines, save the walls and towers, that were battered. And (the captain of the place) made sorties in the darkest of the night, and struck boldly the first that he found in the trenches and approaches (who were few in number and suspected nothing), and finally with them in flight and destroyed, and made a great fight for the artillery."

Note 1.p.432. Memoire d'Olivier de la Marche. Chap. 27.

After the battle of Montlhery (1465), when the count of Charolais marched on Paris, the king (Louis XI) had assembled at Paris a great army and grea soldiers, and in a dark night sent the free Norman archers to make a trench along the river; and the trenches were equipped with artillery, so that they f fought along the river and across; and could only stop at Conflans with great difficulty; but the duke of Calabria and the count of Charolais in person reconnoitred the said trench, and soon caused to be brought great harves vats, and of these m made great ramparts fitted with good artillery, and so battered across the river, that the Normans in the trenches dared not raise their heads." [2] Thus about the middle of the 15 th century were already made approaches, trenches uith batteries, and the artillery had become sufficiently portable, that it was possible to mount it on embankments, ramparts in the country, that strongly resembled our forts. The English had a numerous artillery at the siege of Orleans, and did they not think that the besieged could reply to it? [3] That will explain why they did not believe it at first possible to make approaches and establish batteries. Their mortars could only throw stone balls over the ramparts, but not to make a breach. On the contrary it seems that the French artisans that made the first guns od cast metal were preoccupied in obtaining a direct fire, and consequently in making a breach.

Note 2.p.432. Memoire d'Olivier de la Marche. Chap. 35.

Note 3.p.432. The artillery of the Orleansists was in fact much less numerous than that of the besiegers, but it seems that it was better served. Besides, the English artillery was only composed of mortars with parabolic fire, while the Orlea-

Orleansists possessed some pieces directly throwing metal balls.

Their cannon being placed in battery on the rampart of Belle-Croix and on the towers at the edge of the water at Orleans, greatly damaged the little castle of Tournelles occupied by the English, and at the siege of Jargeau the French cannon d destroyed the works.

During the reign of Louis XI, great circular ramparts were built around salients in some places, [1] to compel the assailants to commence their works of attack only at quite a great distance from the ramparts. About that epoch many old towers are terraced to receive guns in battery, and their bases are surrounded by banks with scarp and parapet to protect them a against hostile balls and obtain sweeping fire. Instead of the barbicans erected during the preceding centuries, they established great ramparts of earth, that battered the approaches afar. Those arrangements must introduce considerable changes into the art of attacking fortresses. Then they commenced to form before besieged places camps connected by ditches and parapets, from which extended branched trenches, that permitted passing under cover to the counterscarp of the ditches. On the other hand, the defenders extended their earthworks to batter these trenches. Gradually these works became farther from the foot of the old ramparts retained for commanding. Those are at first circular or square forts connected by banks of earth with ditches and palisades. Then these forts changed form, taking the shape of great bastions with epaules. Between them are no longer continuous lines but bonnets also of earth, that protect their intervals. Those bonnets also are sometimes doubled already at the end of the 15 th century, and resemble actual tenailles.

Note 1.p.433. Art. Architecture militaire, Figs. 48, 49.

In France is most rapid the abandonment of the methods of fortification of the middle ages. The military spirit of the country comprehends that the extent of the defense is more e efficient than its concentration, and while Italy and particularly in Germany, men continued to erect great circular forts, believing in the utility of accumulated obstacles, they already on this side of the Alps and the Rhine traced extended fronts with large flankings and little forts designed to injure the works of approach. In 1500 Germany still persists in

in erecting successive defenses and in maintaining elevations for commanding; [2] but our engineers lowered the old towers, filled with earth their retained bases, and further contented themselves with low terraced works with trenches and quite distant forts. Those engineers of the end of the 15 th century already very well understood that with artillery, it is n necessary to prevent the assailant from converging his fire on one point. At the beginning of the 16 th century however, after the wars of the Milanese, Italian engineers build very fine works, well understood in detail as in general. The ramparts that they erect at tha epoch are worthy of admiration although those works always have the defect of accumulation of defensive means and of short flankings.

Note 2.p.433. For example, as at Nuremburg. (Art. Tour).

Before those improvements in the art of fortification, if was necessary to establish one's self solidly and to proceed with the aid of very powerful means. But such is the power of tradition, that the principle of certain systems of attack p persists in spite of the new engines adopted. If the besiegers no longer build rolling towers, nor even platforms attaining or exceeding the level of the battlements of the place to be attacked, they long continue still to erect great ramparts of earth of considerable height to batter the walls from a distance and to enfilade the curtains. Artillery did not then posses hollow projectiles, or at least this sort of projectile was but rarely employed and produced but little effect, because of the small range of the mortars by which they were thrown. Rebounding fire had not been practised; it was necessary to see the points to batter, and necessary to establish siege batteries having a considerable command. From 1500 were buil around places bastions or forts with embankments. The cannon covered by these banks could not be dismounted by rebounding fire, so it was necessary to extinguish their fire, to dominate t e upper level of the fort and send plunging projectiles over the embankment. Thus in the reentrant angles, at the beginning of the 16 th century, were established casemates where the guns were sheltered; then on the ramparts or behind the reentrant angles of the embankments were cavaliers, whose guns could reply to cannon placed in battery on the great forts of the besiegers. These methods were pursued and improved durin

the course of the 16 th century.[1] Alsace was one of the provinces where these works were studied and executed with remarkable care after the end of the 16 th century. The Treatise of the celebrated engineer, Daniel Specklin, printed at Strasburg in 1582, indicates a series of practical observations of great value. Specklin already seeks to protect from rebounding fire the batteries established behind the embankments;[2] he gives ingenious means for repairing breaches and arresteng assaulting columns. Besides, he faces only the lower works, and his cavaliers and traverses are of stone. He avoids the use of masonry for elevated commands, which at that time is a very notable advance, since there were established and still retained in Germany and in the North of Italy grea masonry towers to command the outworks. He seeks to mask the facings, and h his drawings have an amplitude, that distinguishes most of t those followed until Vauban.

Note 1.434. See the beautiful work of Buonaiuto Lorini, le Fortificationi, Venice. 1609; also Francesco Tensini, la Fortificatoni,etc., Venice. 1645. -- La fortificaton demontree, by Errard of Bar-le-Duc. Paris. 1620.

Note 2.p.434. See on p. 33 the Fig. indicating that then rebounding fire was already used.

Finally, artillery chaoged the conditions of attack,and consequently of defense; and it is interesting to observe how thi toog considerable time to take an exact account of the effects of cannon. During the entire first half of the 16 th century, the defense was still under the power of the traditions of t the middle ages, and only adopted means evidently insufficient and little expedients; it seems that it could not decide to admit the powerful effects of artillery. But the wars at the end of the 16 th century were a cruel experience. During those struggles the art of defense is really transformed, leaving aside the old systems in search of new ones, the engineers, both military and constructing, form a special corps in condition to work against artillery, whose fire is rapidly improved. At the beginning of the 17 th century in fact, the artillery had nearly reached the point at which the wars of the revolution and of the empire found it. Opposed to this arm that had so rapidly attained a considerable development, the art of fortification was slowly transformed. Men of genius were nec-

necessary to place it on a level with the engines of destruction, tha so profoundly modified the art of war, to find a practical system, that should lead states and cities into impossible expenses. Vauban knew how to solve this problem.

It is set anew todan by artillery with more than doubled power. perhaps wars will cease on the day, when men recognize that there cannot be made a cannon, to which cannot be opposed an impenetrable defense, nor erect an obstacle that cannot be overthrown at once by a projectile. These two powers of attack and of resistance being neutralized, it must be hoped that governments will only have as a last reason the respect for equity and an appeal to the moral sentiments of the material interests of the peoples.

SIGNES (des evangelists), see EVANGELISTES; (du Zodiaque) see ZODIAQUE.

Signs(of evangelists), see Evangelists' (of zodiac), see Zodiac.

SOCLE. Socle. Plinth. Base. Footing.

Lowest course of a pier, column or wall. The socle is always marked by a projectionl a more or less pronounced footing. A moulding marks this projectionl that is never left horizontal in the structures of the middle ages. In Romanesque architecture the profile that habitually crowns the socle is a bevel of 45° to 60° (see at K, Fig. 1). Later, during the period called Gothic, the profile of the socle is often a moulding so traced as to present no salient corners able to hurt the passer.

Fig. 1 presents at A the profile of a socle still Romanesque, adopted below the piers and bases of the columns of certain monuments of Burgundy, Champagne and Nivernais; at B is the profile of the socles of buttresses of the 12 th century (Languedoc and Auvergne); at C are profiles of socles of the 13 th century; at D being those of the 14 th and at E of the 15 th. Generally on the exterior the socle indicates the level of the internal floor. It is unnecessary to state that the constructors chose the hardest materials for the socles.

SOL. Soil. Ground.

One means by the phrase good ground, earth on which can be placed the foundation of an edifice. (Arts. Construction, Foundation).

SOLIVE. Joist. Floor Beam.

A timber resting on the girder on the floors of the middle ages, supporting the area on which are placed tiles or planks, and remaining visible beneath that area. (Art. Plafond). Being visible, the joists in the floors of the middle ages are frequently moulded, decorated by carving, or at least are carefully squared. It was the custom to place joists with equal solids and voids, i.e., there was left between them just the width of a joist. The side of their square varies according to the span from 8.7 to 6.4 ins. Whether gained into girders, simply set on those beams or on wall beams, their span remains always free, and the chamfers, mouldings and carvings only commence at a certain point of that span. Here (Fig. 1) are several examples of joists.

Example A (13 th century) comes from a floor of a house at Angers. The two lower angles are cut off by a flat cavetto. Examples B come from the organ gallery of the church of Saulieu. The last joists are delicately profiled and date from the 14 th century. Ornaments only carved near the bearing, to the eye give strength to that. In the 15 th century (principally when cut from fir), joists have little thickness and much depth, as shown by the example in Fig. 2, taken from a house of S. Antonin. Then they are framed into the girders by a rest and a tenon (see at A). This sort of joists is spaced apart f from 2.0 to 3.0 ft., and receive cross pieces that support t the floor and ceiling. In some southern cities like Narbonne, Beziers, Aigues-Mortes, Perpignan, etc., only fir was employed for floors; the girders are sufficiently close together, and joists are quite small (4.3 ins) and are very close. On top is placed a covering of strong planks 2.4 ins. thick with battens, that supports the floors. Thjoists are generally painted as well as the spaces between them.

SOMMIER. Impost.

The stone that receives an arch or a number of arches and serves them as a springing or starting point.

In the architecture of the middle ages arches fill a very important place, and the imposts, the manner of drawing and cutting them, and their setting occupied constructors. These come at the middle of the 13 th century to a science of com-

combination and perfection of execution in the manner of constructing vaults, which have no equals. Now in the drawing of a cross vault, for example, all the differences come to be solved in the imposts.

Articles Construction and Voute emphasize the importance of the imposts in the jointing of the arches of vaults. It is unnecessary for us to enlarge on the manner in which the drawings are made according to the position and curvature of these arches. We shall occupy ourselves only with the ornamental part of this structural member of vaults.

Dating from the end of the Romanesque pesiod, the architects of the middle ages frequently occupied themselves in decorating the springings of the arches of vaults above the capitals. It evidently seemed to them that the transition between the richness of the capital and the coldness of the mouldings of the arches should be arranged. At that epoch at the end of the 12 th century, the piers still had a very simple section and the arches were already furnished with mouldings. On the capitals strong abacuses served as bearings for those arches, and thus there was an abrupt interruption between the supports and the object supported. Now the feeling of these masters indicated to them that a connection was necessary between the piers of simple section and the arches lightened by mouldings, or at least it was necessary to show to the eyes how these groups of mouldings could start on a horizontal bearing' that there was something shocking in the penetration of the arch mouldinms into abacuses of rectangular shapes. Thus when (Fig. 1) the architect placed on the rectangular abacus A of a capital an arch B also of rectangular section, this arranged itself naturally. But when to obtain a richer and more elegant appearance, he desired to give that arch a moulding C, for example, the corner D of the abacus appeared to project too much and suppoted nothing. Now if we see now the Romans supported the arches of vaults, not on the projection of the capital but vertically over the face of the column, -- which made the capital useless, -- we find that the architects of the middle ages were more logical in their construction, and claimed to utilize the projection of the capital and support the arches by corbelling.

Then the angle D being isolated shocked their logical sense

in accord with the feeling; they returned the moulding C at the impost as shown at E, or indeed (Fig. 2) they stopped the profile by an enlargement and caused its mouldings to penetrate the square section. [1]

Note 1.p.440. From the church of Montreol, end of 12 th century. At A is sketched the section of the impost at the level o, with the position of the column and the intersection of the half cylinders above the abacus.

Those masters of the middle ages were refined, which no longer has a hold on us, too much men of affairs to seek anything but ordinary great success, easy and fruitful. To mould an archivolt, "to stop that moulding on an abacus or an impost, requires only the trouble of giving a profile to the stonecutter; but to stop that moulding at a certain height above the lower bed of an impost, and to find a transition betwwen the moulded curves of the horizontal cap of a pier or column, is to give one's self trouble that the artists working for the Romans of the empire regarded as superfluous. Our architects of the end of the 12 th century, in whom a nascent science had not yet stifled the true feeling of art, did not think that a moulding could start from nothing, or stop abruptly on another member without any connection, root or base. They only decided to suppress this root of the mouldings of arches, when these are only, so to speak, a prolongation of the cluster of little columns composing the piers, and when the capitals are reduced to the state of ornamental rings separating the vertical members from the curved members. Thus the decorative importance of the imposts diminishes when the section of the pier approaches that of the arches, to efface itself entirely, if these piers consist of a number of members equal to those of these arches.

In the choir of the church of Notre Dame de la Coulture at Paris exists au arrangement indicating very clearly the part, that the architects of the 12 th century assigned to the impost. The arches of the vault, comprising a diagonal and two side arches, rest on three little columns with rectangular abacuses. Yet the diagonal arch is moulded with projecting angle (see A, Fig. 3, the profile of that diagonal arch); the architect has set before this arch moulding and the abacus an entire statue with its canopy, which serves as a base of the

moulding. Windows rebuilt and enlarged in the 14 th century under the side arches have destroyed the beautiful arrangement of that apse, but the diagonal arches have remained intact with their great impost in a single block. Still in this entirely primitive arrangement remain indecisions and imperfect parts; the side arches rest quite awkwardly on little columns that seem too large to support them. The abacuses of the capitals do not bear these side arches; they rise abruptly on their useless projections. Gradually these experiments disappear, there are no more of those projecting members, without r reason, and the ribs of the arches start on the capitals with surprising energy. One of the most beautiful examples of those imposts arranged with skill and reason is found in the hall of the ground story of the keep of Coucy.

The plan of this hall [1] is a dodecagon with 12 recesses in the form of niches on each face. In the 12 reentrant angles are 12 isolated columns, but whose bases and capitals belong to the structure. From 12 capitals rise the diagonal arches of the vault and the little columns that receive the side a arches at a higher level, [2] Here, Fig. 4,.at A are the horizontal sections of the little column, the abacus of the capital, the diagonal arch and the little columns supporting the side arches. One sees that these li tle columns and their bases exceed the projections of the abacus of the capital. In fact it is necessary at the height of a man to have as little projection as possible, so as not to obstruct the circulation, and to disengage the piers of the niches. On this very slender column (for it is only 6.1 ins) it is necessary to rest that arch, the rib of an enormous vault, and the little columns of the side arches. That would have been easy with the aid of a corbel; but for the eye tha method would not have enough importance, it would not connect the upper member of the bas...

Note 1.p.441. Art. Donjon, Fig. 35.

Note 2.p.441. The some, Fig. 39.

Then the architect arranges the imposts as shown at B in the perspective sketch. To start the diagonal arch on the front angle of the abacus, a figure is crouched, and at both sedes of this arch on the side corners of the abacus rise two foliage corbels receiving the bases of the little columns of the side arches. The lower bed of the impost is at a, the upper

bed at b. The beds are horizontal up to the height of three or four courses of the diagonal arch. These groups of sculpture and of mouldings have a robust effect, that reassures the eye and produces the most happy effect; the sculpture is further treated marvellously. The general drawing C shows how the course d of the impost retains its upper horizontal bed for the arch, and how it is cut at the sides to receive the voussoirs of the tunnel vault d.

In developing its system of vaults and in subjecting more and more the section of the piers to the section of the arches, the 12 th century loses these firm and bold compositions. Yet until about 1250 the imposts of vaults are sometimes decorated to establish the transition between the capital and the arches. We have an example in the hall of the synod of Sens, which dates from that epoch. Above the capitals, between the rounds and in the cavettos of the arches cling leaves up to the level of the upper bed of the impost. The imposts of the vault of the chapel of the Virgin in the cathedral of Auxerre, placed on the two isolated columns of the entrance, are richly decorated by foliage and crockets between the ribs of the little columns bearing the side arches. [1] In the cloister of the church of Semur-en-Auxois, one likewise sees imposts decorated by crockets between the projecting ribs of the arches. [2] This consistent method for giving richness to the imposts is peculiar to Burgundy, where the taste for plant ornamentation was retained late. Thus in the architecture of the 13 th century, the use of the blind arcade to occupy the substructures or c certain solid parts of the structure is frequent. [3] The mouldings that compose the little archivolts resting on the capitals form at their springing a small group (although this group exceeds the diameter of the little column) by even the contrast of these fine members above a plain shaft. The light on the little column is wider and announces more importance, as it can have all the fillets of light caught by the mouldings. From that results a disagreeable effect because the supported part does not appear to weigh on the support. Then to remedy that defect, a head, a bunch of leaves, or a crocket projects from this group of mouldings between the archivolts. Around the side aisle of the choir of S. Etienne of Auxerre, there are heads that project from the impost of the archivolts of

the arches. At the base of the tower -- unfinished -- of the church of S. Pere-sous-Vezelay,[4] there are beautiful crockets, widely expanded, that give strength to the imposts of the great arcade, Fig. 5. Assuming this crocket suppressed, the springing of the trefoiled archivolts on the abacuses of these capitals is lean and an awkward support. (See the horizontal section A of that springing on the abacus). The stem of the crocket fills the space a, and its broad foliage connects the trefoiled mouldings of the capital.

Note 1.p.444. Art. construction, Fig. 84. The construction of this chapel dates at the end of the first half of the 15 th century.

Note 2.p.444. Same date.

Note 3.p.444. Art. Arcature.

Note 4.p.444. Part erected from 1240 to 1250.

But the open arcade that composes the triforium in the church of Semur-en-Auxois, furnishes one of the best understood examples of those decorated imposts. There are heads detached above the capitals (Fig. 6). This sculptured projection is t the more necessary, because without it, the axis of the little column would find itself under the wide void resulting from the intersection of the two cavettos of the profiles of a the archivolts. This was not only a very proper feeling for effect that led those architects to charge the imposts with projecting ornaments, but it was also a judicious calculation. The imposts are naturally destined to receive vertical and o oblique loads, even by that the stones employed to cut them are subject to pressures that could crush them. There is then an advantage in leaving to these pieces of the masonry the greatest possible mass, even outside the points at which act the pressures. But in architecture from the general to the o details, what reason indicates is it not always in accord with the feeling, with the need of the eyes? Our masters of the middle ages certainly believed it, or rather they did not separate these two faculties; the one that advises, and the other that approves if the counsel is good. To see their works in the small details as well as in the great parts, one soon recognizes that they did not divide the mind of the artist by a separating reflection, observation, reasoning and calculation from the other sort of vague inspiration, indescribable and

poetic, if you wish, tha we call feeling. At least with the architect, the two faculties could only act simultaneously to produce a work. Thus in these works all belongs together and is connected as in an organism, and there is no part, of which one can say; "what is this doing there?"

Note 1.p.445. Port from 1240 to 1245.

In the lower work of the western portal of the cathedral of Rheims one can note more than one fault. Those three immense recesses of the doorways are not perfectly connected with what is placed over them. One feels there a renewal, a chauge in the primitive composition, and a desire to produce a surprising effect by the superabundant accumulation of details. Yet if one examines this portal, -- further much altered by bad restorations, -- what ideas, what boldness happily undertaken and more fortunately expressed in stone! The imposts that form the springing of the front part of the three arches, in composition and execution are one of the most beautiful parts of that prodigious work. The architect has known how to give these relatively narrow springings the strength of a support by the arrangement of the sculptures. These combine with the construction to make apparent the strength. All that is reasoned, true, easy to comprehend and logical, and all is permeated by a feeling of art on the effect it is desired to produce.

Before two immense archivolts that nearly touch, it is necessary to find a point of support, a point resistant in the eye, without falling into the dryness of a pilaster, a column, of a rigid vertical support. It is further essential, according to the excellent principle of the constructors of that p period, consistiug in never cutting the sculpture or the complete architectural members by joints or beds, to conform to the jointing suitable for a colossal superposition of imposts. It is necessary to start from nothing that support or group of supports; to gradually develop the resistance, not only in appearance but in fact; consequently to gain projection; to obtain fineness as imposts are accumulated, for at the junction of the two gables crowning the archivolts, it was necessary to throw off the water by an enormous gargoyle. To terminate abruptly that superposition of corbelled imposts by a gargoyle and the junction of two gables was to produce for t the eye a disagreeable effect of rocking, almost disquieting.

What does the architect do? Back of the projection of the corbelling and as if to destroy the rocking effect, he places a statue; not a standing statue relatively small at its base, but seated, broadly draped and in a quiet pose. Then behind the back of the statue on the face of the junction of the gables, a tall open pinnacle, in the midst of which stands a statue.

Fig. 7 can only give an imperfect idea of this beautiful c composition, that produces such a striking effect on the monument. At the base is a water-carrier, a half round and finely rendered figure, above which expands a large bunch of leaves with its abacus. A wide cariatid, stumpy and draped, standing on this abacus bears on its shoulders a thick abacus, that s serves as a support for a gargoyle, composed of three courses corbelled on each other. There end the rakes of two gables. Then recessed on a perforated base to allow the water to pass sits a crowned harper; behind him rises the pinnaclea The aquarius is one course; the bunch of leaves is a course; the cariatid is a course' the abacus a course, the gargoyle occupies three courses' the base of the harper is a course below the rakes; in all are eight courses of enormous stones entering far behind the extradoses of the arches, as if to form a balance. The statuary is admirably fitted to the scale of the architecture and is beautiful, grand and simple. Nothing is more graceful than that expansion more and more powerful, as if to support the colossal animal surmounting it, terminated by this harper, and this delicate pinnacle protecting a statue. The contrast between the lower part where the stone casts a strong and broad shadow and the elegant crowning, all gleaming with light, is most happy. [1]

Note 1.p.449. The front portion of the stone gorgoyle was broken and replaced in the 15 th century by a great and quite grotesque head of lead, The other parts of this masterly impost (that on the left) have suffered little.

It is far from this complete alliance of architecture and sculpture, of this exact application of an accepted scale, to those overloaded ornaments, mouldings, fronts, tympanums charged with incongruous sculptures, without relation of scale, that we see accumulated on most monumental facades. But why do we complain of this abuse? Even because of their excesses, w

will they not bring the taste of the public to well conceived perceptions, well arranged and wisely executed?

It is very difficult to unite two archivolts on one point of support, and to crown them by two gables, especially if the archivolts do not have the same curvature, and if the gables do not have equal openings, for then the lines are lame. The masters of the middle ages always skilfully got out of that difficulty, either in grand conceptions, like that we have just mentioned, or when it concerned archivolts of shrones, of little portals or tombs. Sculpture then comes to the aid of the architect to strengthen the too meagre imposts, to destroy the bad effect of limping curves, to mask the complex intersections of mouldings. Sister of architecture, neither its tyrant nor slave, it takes its place in the concert.

It is known tha the system of the cross vault permits the obtaining of the openings to arches of dimensions and resting on the same point of support; that these arches can have their springings at different levels. [2] Then the imposts of these arches sometimes appear to bend the column and its capital. For example, at A in Fig. 8 is an isolate column supporting two transverse arches B of equal spans, and two other transverse arches C and D of unequal spans with springings at different levels, as well as four diagonal arches; the column is p perfectly vertical, but will appear inclined from a to b, or it will indeed be necessary to give the capital an exaggerated importance. But if between the arches (see at E) in the impost we have sculptured ornaments that catch the eye and prolong the ornamentation of the capital, so to speak, that illusion produced by the curved lines unequally joined with straight lines will disappear, especially at d below the springing of the highest arch we retain a projection, that permits sculpturing a head, group of leaves, or any other object, whose projection from the moulding will form an abutment to the arch D with the lowest springing. But we shall return to the arrangements for balancing imposts in Art. Voute, and it is unnecessary here to extend farther on this subject, examined only f from the point of view of ornamental appearance.

Note 2.p.449. Figs. 49, 49 bis.

The stonecutter of the 14 th and 15 th centuries was a very skilful draftsman, and established the imposts of arches of

SOUBASSEMENT. Substructure. Base. Foundation.

Lower arrangement of an edifice or portion of an edifice. T The substructure differs from the plinth in being composed of several courses, and that it assumes a certain importance in height, projection and richness, while the plinth is only a single course forming a slightly pronounced footing. A pier or column may rest on a plinth, that is then isolated like this pier or column. The character of the substructure, besides its importance, is that of being continuous. The low wall that receives the piers of a cloister, for example, is an actual substructure. A building with ground story raised 6.6 or 9.8 ft. above the external soil rests on a substructure. This substructure may then be pierced by openings admitting light into a crypt or cellar.

Most of the Romanesque churches possess crypts partly sunk into the ground, partly above the external pavement; these h half cellars form a substructure on which rises the monument. The architects of the middle ages having a custom from the m most ancient epoch, of subjecting the proportions of the external arrangement to that of the internal arrangement, it results if an apse, for example, must stand over a half buried crypt, the architectural arrangement of this apse only commences above this crypt; therefore it is necessary that the part of that seen externally should form a substructure distinct from the architectural arrangement, that only begins at the level of the choir. This principle was adopted from the most beautiful monuments of antiquity and furnished motives, that the masters of the middle ages knew how to use. It is in the east along the banks of the Rhine, that one still finds today the grandest a raagements of the substructures of apses. The Rhenish school was inspired by the Byzantine school until the 12 th century, and had adopted from it more than any other, the grand part of breadth and monumental appearance.

In the matter of substructures of the beginning of the 12 th century we know of none of more beautiful character than that of the eastern apse of the cathedral of Spires.

We give its profile in Fig. 1, a perspective view in Fig. 2. One sees in these two Figs. how are pierced the windows of the crypt, that extends beneath that apse; how the engaged columns that serve as buttresses for the circular wall are placed on

that enclosure of successive mouldings. There is evidently a reminiscence of the best Romanesque-Byzantine structures.

Note 1.p.453. This substructure is built of red sandstone.

Later some of our cathedrals of the 13 th century, although they possess no crypts, support all the projections formed by the buttresses of the apsidal chapels on a great circular substructure composed of a series receding beyond each other. T Thus are arranged the apses of the cathedrals of Amiens and Beauvais, and the massive substructure of the latter rises more than 6.6 fta above the old external pavement. At Amiens this same circular substructure is only 3.3 ft. high above the old ground of the cloister. At Chartres, the choir of the cathedral of the 13 th century having been built on a Romanesque crypt, the beautiful substructure faces that; on its recessed crowning courses are placed the apsidal chapels.

The substructures of the portals of churches are often decorated by moulded benches, arcades, tapestries in flat relief, subjects in medallions, etc. The architects of the 12 th and 13 th centuries were particularly pleased to decorate with great care those parts of the architecture placed near the e eye. To convince one's self of this, it suffices to examine the substructures of the cathedrals of Chartres, Rouen and S Sens (12 th century); those of the cathedrals of Paris, Amiens, Noyon, Rheims and Auxerre (13 th century); of Rouen (of the Calends and library) and Lyons (14 th century). Whatever the richness of the decorations adopted, they are always subject to a beautiful general system, free and broadly profiled, put in admirable proportions, a ranged to give value to the upper parts and to support them. The richness of these substructures is never obtained by detriment to the strength, and their profiles have an amplitude and frequently an energy, that one r rarely finds in antique Roman architecture, but which singularly approaches Greek designs. After the beginning of the 13 th century the compositions are distinct from the substructures of portals. In the 12 th century the examples just cited have rather the character of great ornamented plinths, than of actual substructures forming a special arrangement: for example, like the beautiful arcades of the portal of the Virgin on the western facade of the cathedral of Paris; [1] or a again the lower tapestry of the central doorway of Notre Dame

of Noyon (Fig. 3); that of the three portals of the cathedral of Amiens, so amply composed.

Note 1.p.455. Arts. Arcature, Fig. 22; Porte, Fig. 68.

There are examples of substructures from the beginning of t the 13 th century, decorated by arcades, that are also of very beautiful character. Besides that taken from the portal of the Virgin at Notre Dame of Paris (western facade), we cite the substructure of the splays of the principal portal of the c cathedral of Seez; [1] the substructure of the north portal of the cathedral of Troyes, whose composition and execution are in the best style. [2]

Note 1.p.456. Art. Arcature, Fig. 19.

Note 2.p.456. This substructure was unfortunately maltreated at the end of the last century.

The portals of Notre Dame of Rheims and the north portal of the cathedral of Metz present substructures of unusual composition. These substructures are decorated by draperies in relief. Those of Notre Dame of Rheims are well known; it is unnecessary to present them here, because they have been much changed by successive restorations. But the substructure of the north portal of the cathedral of Metz is well preserved, is indeed a little later than that of Rheims, and better understood. (Fig. 4).

On a surface composed of a plinth and of three plain courses, a hanging seems to be attached to a rod, and above it develops a brilliant band with beaded diagonals and fanciful animals in the spaces between the diagonasl. This substructure is terminated by a beautiful moulding ornamented by a row of leaves in the cavetto.

The diversity of decorations adopted for substructures is infinite, until the moment when the vertical lines of the upper piers intersect them and join them to the arrangements s supported. In fact, they disappear then as also disappear the horizontal members of the architecture, the offsets, to allow the vertical lines of the architecture to dominate. There was a seeking of absolute unity that we shall explain in Art. Trace

Naturally, when the level of the vaults of cellars in civil edifices was placed above the external ground, the mansions or houses possessed a substructure, i.e., a lower arrangement supporting that of the ground story. These substructures were

often rich in profiles, in well cut ventilation openings, in scattered arms, fleurs-de-lis, snells, sosettes, little crosses, ciphers or devices. [1]

Note 1.p.458. See the old city hall of Orleans (middle of 15 th century), in the work of MM. Verdier & Cattois, Architecture civile et domestique. Vol. II.

These substructures are always well profiled and in happy proportions. They do not present projecting mouldings,that a are easily broken, and whose angles risk injury to passers. The ornaments decorating them are flat,and do not take from these lower members the appearance of strength, that they should retain.

STALLE. Choir Stall.

We have to occupy ourselves here only with the stalls of choirs of of chapter halls, i.e., with those rows of seats p placed in the choirs of churches or in assembly halls, and destined for the members of the clergy, for the religious of a monastery, for a chapter, or even for laymen gathered in council.

In the oldest western churches, in the cathedrals and great abbeys, the bishop or abbot was seated at the back of the choir behind the altar. Around him took their places on benches arranged in a semicircle, the members of the chapter or society. The cathedra or episcopal throne dominated the benches of stone, marble or wood, that furnished the back of the apse. This arrangement is still retained in some of the oldest churches of Italy, but has entirely disappeared in France; where one no longer finds a trace in our religious edifices, of the cathedra and the benches accompanying it. From the 13 th century in cathedrals the seats of the clergy have been placed before the sanctuary, at both sides of the space now designated by the name of choir, and which habitually occupies the p part of the church comprised between the transverse aisle and the steps of the sanctuary ascendind to the altar.

Note 2.p.458. Arts. Choeur; Jube.

The choir being thus equipped with stalls at the sides and front, has been surrounded by an enclosure more or less rich, and closed next the transverse aisle by a wooden screen pierced by one or three doors. [2]

In the abbey churches, from the same epoch the choir was m most frequently placed at the extremity of the nave and in t the transverse aisle; the entire eastern portion being reserved for the sanctuary placed over the crypts containing the sacred bodies.

There is every reason to believe that wooden stalls in France date back to a distant epoch. The rigor of the climate rarely permitted the establishment of benches or stalls of stone or marble, as practised in the Latin churches of Italy and of Sicily. Further the custom of working in wood in Gaul, and the abundance of this material on French soil, must have very early caused the adoption of wooden stalls. Still we possess none that may be earlier than the 13 th century; those remaining to us from that epoch however emphasize fixed forms, that can only be the result of a long tradition. Since then the arrangement of stalls has not changed. Men have found nothing better or more convenient in use.

The wooden stalls consist of a back, quite high and terminated in its upper part by a projection in form of a canopy; arms; a plank serving as seat and turning on hinges or pivots, and beneath which is fexed a corbel called miserere or patience, that allows those present at the offices to sit, while apparently standing. Before each stall is a desk that serves as back for a row of low stalls without canopies. In fact, in t the choirs of cathedrals and abbeys, the stalls or seats are habitually in two rows; high stalls for the canons or religious, low stalls for the inferior members of the clergy or society. [1] The floor of the upper stalls is raised by two or t three steps above the pavement of the choir, while the low stalls rest on it or on a single step. The persons seated in the high stalls are thus much above those placed in the low stalls, and so can see the sanctuary. Spaces arranged between the low stalls, called entrances, allow one to reach easily the upper stalls. The artists of the middle ages displayed a great luxury of ornamentation in the design of stalls. Skilful in fashioning wood, they have left some very remarkable specimens of those works in joinery, in spite of the systematic destruction to which they had to submit during the two past centuries (17 th and 18 th). Yet unfortunately the richest churches were those, that saw their old furniture disappear

that remained to us are remains saved by chance or belonging to poor churches. The clergy beyond the Rhine, more conservative than ours, has allowed a great number of those beautiful works in wood to remain, but which are not earlier than the end of the 13 th century, with very rare exceptions. [2]

Note 1.p.459. Yet there exist choir stalls in a single row with desk, notably in the provinces of the East and in Germany.

Note 2.p.459. Among others, the wooden stalls of the churches of Ratzeburg, given by M. J. Gailhabaud (Architecture du Ve au XVIIe siecle, etc. Vol. IV.)These stalls appear to date f from the middle of the 12 th century. They are very rude and in the condition of fragments.

Among the oldest French stalls must be cited those of the chapel of Notre Dame de la Roche, beautiful fragments in the cathedral of Poitiers and in the church of Saulieu. These works in wood date from the middle of the 13 th century, and t they give us an idea, notably those of Notre Dame de la Roche, which are entire, of what must have been the stalls of our c cathedrals of Chartres, Bourges, Paris, Rheims, of the abbey churches of S. Denis, and of S. Remi of Rheims.

Let us then first examine those stalls of the chapel of Notre Dame de la Roche, very well engraved by M. Sauvageot. [1] These stalls are in two rows, high and low stalls. The high stalls alone have a back without canopy, but with partitions above each arm, as if to entirely separate the religious. T These arms are 2.1 ft. between centres. This distance varies little and does not exceed 2.3 ft.

Note 1.p.460. Chapelle de Notre Dame de la Roche, by M. M. Sauvageot Bros. paris. Morel. 1863.

Fig. 1 gives at A the plan of a portion of these two rows of stalls. The low stalls rest directly on the floor of the choir; the upper stalls are on a floor p raised two steps. The stalls not being numerous, there are no entrances to the high seats except at the ends e. There more important and decorated sides terminate the rows of seats. The section C explains the arrangement of the seats with their hinged boards and their misereres. One will note that the arms are slightly inclined to offer a more stable rest for the arms of the religious, when they stand and rest only on the misereres and these arms. The planks a serve as desks for the persons occupying

the upper stalls, when they kneel on the floor. Those less w worthy bein present, who occupy the low stalls, kneel on the pavement of the choir. This wordwork is well profiled, and t the very simple decoration is in charming taste. For more details one can refer to the monograph of the chapel of Notre Dame de la Roche, [1] which presents a complete study of these stalls.

Note 1.p.461. By MM. Souvogeot.

Although much mutilated, the stalls of the church of S. Andoche of Saulieu still show us interesting fragments. They are about fifty years later than those of Notre Dame de la Roche; consequently they date from the end of the 13 th century. One sees at A (Fig. 2) one of the terminal ends of the high stalls, and at B of the low stalls. A canopy composed of a single inclined ceiling covers the back D of the high stalls, which presents wide panels over each seat, enclosed between verticals with arch and ornaments carved in the corners. Some parts of these carvings in wood are very well treated. At C is drawn a variation of the arm c. The verticals, sides and frames are made of oak 3.7 ins. thick. At E (Fig. 3) we give one of the partitions of the stalls, with the profile e of the moulding of the quadrant and the pretty arrangement of the fret f. The plank seat is represented as down. At G is given one of the misereres, and at H is a variation of the terminals, that lead from the quadrants to the supports of the arms. These terminals serve as grips for the hands when one desires to rise; they exist on the low as on the high stalls.

From the end of the 13 th century the canopies of the high stalls assume importance. At first composed of a plank forming an inclined soffit, as in the preceding example, this ceiling gradually projects more, is borne on corbels, curved in form of a vault, then at the end of the 15 th century is arranged in as many little vaults as there are seats. These canopies are then enriched by arms, keys and ribs. Suspended arcades project beyond the greatest projection of the seats. The sides are covered by perforated sculptures. We have no longer in France existing examples sufficiently complete of the stall of the transition between the 13 th and 14 th centuries, and it is necessary for us to have recourse to those still existing on the Rhine and in Germany. The beautiful stalls of S.

Gereon at Cologne date from the beginning of the 14 th century, [1] and already present sides very richly decorated by figures in the round. The stalls of Anellau, [3] which likewise b belong to the 14 th century, are very complete, and possess a projecting canopy or inclined soffit, borne on the sides and on consoles placed at alternate seats. Here (Fig. 4) is a perspective of these stalls, which comprise only a single row w with backs and benches. This woodwork, of rude work in its d details, is otherwise well composed, and presents a very pure type of the last stalls with canopies and ceilings before the little vaults. [3]

Note 1.p.463. These stalls, or at least those remaining, have been engraved in part in the work of M. Gailhabaud (already cited).

Note 2.p.463. From drawings communicated by M. Boeswillwald.

Note 3.p.463. We cite the stalls of the cathedral of Dol a among those belonging to the 14 th century.

The examples of stalls of the 15 th and 16 th centuries are sufficiently common still in France. We shall cite those of t the church of Flavigny, whose canopies are in form of vaults; of the old abbey of S. Claude, now a cathedral, that dates fr from the 15 th century. The latter are dated and signed; they were made by Jehan de Viery in 1455. Rudely executed, these are still well composed. Mutilated at several times, statuettes and certain parts of the sides are lacking.

Here (Fig. 5) is the front and profile of the high seats. The great panels of the backs are decorated by figure reliefs representing prophets and sibyls. Little figures in the round surmount the little columns of the octagonal section that separate these panels. Other statuettes are placed on the little open upper gallery. The canopies consist of a series of little tunnel vaults perpendicular to the backs.

Fig. 6 shows an end of the high and low seats with the entrance between them. [1] The reliefs are detached from the solid or perforated grounds; statuettes decorate richly and even too richly, those sides. At B is drawn the profile of the low stalls. In spite of the profusion of details, in this Fig. as in the preceding one, the principle of the construction in wood is always visible. But in their richest compositions, the artists of the middle ages never broke this principle, whether

it concerned masonry, carpentry, ironwork or joinery. One cannot study too carefully the assemblage of these great works in joinery of the 15 th and beginning of the 16 th centuries, when Gothic traditions were not entirely lost. Under a very complicated appearance, the construction is always simple and conceived according to the properties of the material. For e example, the stalls of the choir of the cathedral of Amiens, that are charged with a prodigious quantity of details, present wooden construction very well combined and very simple. Those stalls are today 116 in number;[2] they were commenced in 1508 and completed in 1532 by two master joiners, Alexandre Huet and Arnoult Boullin, under the direction of Jean Turpin, and by the carver of images, Antoine Avernier. The total expense rose to 11,230 livres 15 sous.[3]

Note 1.p.465. On our Fig., the crowning A is drawn beside its place and rests on A'.

Note 2.p.465. 32 high and 28 low ones at each side. There were 4 more before the destruction of the rood screens in 1755.

Note 3.p.465. Those stalls would cost today more than 500,000 francs ($100,000).

The oak employed is of excellent quality and nowhere shows traces of worm holes. The high seath at the ends are crowned by very high finials, perforated and covered by delicate details and little figures, carved with precision and remarkable skill with the chisel. All the details that cover the verticals, the cross-pieces, fronts, canopies, arms, entrances and ends are of marvellous delicacy, and furnish much information concerning the clothing and furniture of that epoch. The canopies are in form of small cross vaults and are covered by gables of extreme richness. The great panels of the backs of the high stalls were formerly covered by fleurs-de-lis in relief, that have been scraped off on two occasions, in 1792 and 1831, so that only some traces can now be distinguished.

We give at A, Fig. 7, a portion of the plan of these stalls, and at B a section, that cause to be sufficiently seen the w width of this entirety of joinery.[1] Fig. 8 is the elevation of the high stalls. At C is the section of the verticals separating the panels, and at D is the elevation of one of these verticals with a portion of the two imposts forming an arcade under the little cross vaults. Independently of the marvellous

execution of the details, one finds that work of joinery a rare quality, a very delicate observation of the scale. The size of the wood forming the members is judiciously arranged, so well that the whole is clear and harmonious, and easily appears in the midst of this confusion of ornaments. These do not derange the principal lines, and combine readily with the construction, that is further perfectly stable and has made no movement, The branches of the groin arches of the little vaults are not arcs of circles, but give foiled curves as sh shown by the section in Fig. 7 at B. It is also necessary to cite the stalls of the cathedral of Alby, that date from the same epoch and are complete. Set against a choir enclosure a and a stone rood screen of the commencement of the 16 th century, the stone enclosure forms the canopies over the high seats. The joinery at Alby only comprises the seats alone: the verticals separating the backs are of stone with a covering of painted cloth between them. Otherwise in joinery, these stalls are simple and are scarcely ornamented except at the entrances.

Note 1.p.468. The ends of the arms give Fig. D in horizontal projection.

The most complete series of stalls of the beginning of the 16 th century that we possess, entirely furnishes the choir of the cathedral of Auch. These stalls are much the best preserved. Made of oak of entirely unusual quality, and that by friction has assumed the appearance of cornelian, they furnish a series of ornaments of the Renaissance of the most charming character. Great relief figures adorn the backs, and delicately carved arabesques cover the arms, entrances and vestibules. The canopies are marvels of delicacy and combination. The stalls of the cathedral of Auch were commenced about 1520 and completed about 1546. [2]

Note 2.p.468. See Monographies de S. Marie d'Auch, by abbe Caneto. Folio. 1857.

Stalls of the 16 th century still present some interest, a among others those of the church of S. Bertrand de Comminges and of Montreal; the beautiful fragments deposited in the imperial church of S. Denis, and that came from the chapel of t the chateau of Gaillon. The backs of these stalls are covered by marquetry work, and the arms, misereres and verticals, bel-

belong to the prettiest soulpture of the beginning of the Renaissance.

Although one must regret the destruction of the old stalls of the choir of Notre Dame of Paris, which dated from the beginning of the 14 th century, and that were very beautiful, according to authors that saw them, the stalls rebuilt at the end of the reign of Louis XIV, that furnish that choir today, are of very beautiful woodwork carved with infinite art on well selected oak tolerably framed. Still as a work in wood, t is far from that of the stalls of Amiens, whose connections are drawn and executed with absolute precision, not allowing to be seen a nail, an angle, no even a pin. If one takes apart those stalls of the 1; th century (and those of Amiens belong to the art of that epoch), he can only admire the care, simplicity of means, the precision of those master joiners, the judicious choice of the pieces employed in the work, and the excellent design of the mouldings, so as to take nothing from the strength of the wood. One cannot say as much of the stalls of the cathedral of Paris, and the good external appearance o conceals many faults in construction, expedients and negligence

STATION. Station.

Thus was designated during the middle ages the points of a route where stopped the pilgrims or the processions that transferred the relics of the sacred bodies. The transfer of relics gave opportunity to the people for religious manifestations, of which we cannot form an idea today. All those having some favor to ask from heaven, approached the passage of the relics and hoped to obtain the accomplishment of their wishes by the intercession of the saint whose remains they approached. Enthusiasm doubled around the shrines, if those transporting them made a halt; then occurred sudden healings of those having faith, or a terrible punishment of the incredulous a d p profaners. The memory of these halls was usually consecrated in the country by a small monument, a stone, cross or altar. (Art. Reposoir).

When Philip the Bold caused to ge transported the remains of the king his father to the abbey of S. Denis, he accompanied and even wished to carry the casket containing the bones brought from Tunis to Paris. The funeral procession made the

journey on footand stopped several times on the road. And Corrozet states, [1] "there were erected stations or altars in form of pyramids, on each side of which are the figures of the three kings and the image of the painted crucifix, as one sees them at present. Some call them "mont-joyes." There remains today only a fragment of those stations on the bank of the Seine, at S. Denis itself.

Note 1.p.471. Les Antiquitez de Paris, by G. Corrozed, Parision. 1586.

STUC. Stucco. Plastering on Masonry.

A coating composed of lime, very fine sand, dust of hard 1 limest ne or marble, with which masonry was covered, and sometimes even the jointing of cut stone to obtain externally or internally smooth surfaces without appearance of joints, and which was decorated by delicate sculptures and paintings. Stuccos were employed from the highest antiquity. The pyramids of Memphis were covered by a stucco coating, whose remains a are seen. The Egyptians covered their edifices by a very light coating of stucco to conceal the joints of the stone and to receive the painting. When the Greeks employed cut stone in the ordinary manner, they passed over the surfaces a thin polished stucco, that they decorated by paintings. One finds the trace of this stucco on the Doric monuments of Sicily, at Paestum, etc. The Romans very frequently employed stucco, both for public monuments and for houses. It is unnecessary to cite here the numerous examples of the use of stucco in Italy during antiquity. This custom passed into Gaul, and there is no Gallo-Roman structure in which is not found remains of stucco coatings, i.e., polished and painted. The procedures in construction had the same fortune as the arts; they perish with those of the East at the end of the Roman empire, and the scarce remains of the monuments of the first centuries permit us no longer to see that the rude coatings made of bad materials, badly applied and covered by savage paintings. Yet men had not abandoned in Gaul the habit of covering the rubble surfaces and even rude cut stone masonry, with a coating of lime and sand as thin as possible, to conceal the defects and the joints of the stone and receive coloring. But those coatings no longer have the beautiful polish of the stuccos of

Grecian antiquity and of the good Roman epoch, nor their solidity; thus they are rarely preserved, and their absence makes us believe too readily, that the Carlovingian monuments, for example, allowed to be seen inside as outside their masonry of small stones rudely dressed. Far from that, although those edifices were rude and barbaric, they were plastered inside and outside, and those coatings were sometimes decorated by incisions, by ornaments in low relief, and actual stuccos. One example of authentic stuccos belongs to the Carlovingian period and is still seen in the little church of Germigny-dar-Prés, whose construction dates back to the beginning of the 9 th c century. [1] A mosaic of Greco-Byzantine character ornaments t the vault of the apse. [2] Formerly engraved and painted stuccos ornamented the walls of the church. Those coatings were removed in the lower parts, and are visible only in the interior of the central tower, notably at the openings of that tower, which consist of an archivolt resting on two little engaged columns. Now those archivolts and the little columns are entirely obtained by the aid of a white stucco, fine and very hard, wrought with the chisel while still fresh. Here (Fig.1) is half of one of these openings, at A and B is its section.

Note 1.p.472. On this church, see the Notice of M. Merimee in Vol. VIII of the Revue Generale d'Architecture of M. Doly, p. 113.

Note 2.p.472. This is the only mosaic of that kind that we possess in France.

The arts in the barbarous state do not exclude a profusion of ornaments; the contrary frequently occurs. One cannot doubt that the Carlovingian architecture, so dudely constructed, was habitually erected with materials of no value, badly selected and worse employed, was covered by a very rich ornamentation, though obtained by rapid and not costly methods. Stucco lent itself to this sort of current decoration, and of all the traditions of the art of the Romans, that must have persisted because of the facilities of employing similar procedures. To erect the walls of rubble, and when the structure was finished good or bad, to conceal the irregularities and experiments by a plastering on which the engravers and sculptors incise ornaments taken from fabrics, furniture and utensils brought from the Orient, was evidently the procedure employed by the naive

architects of the first period of the middle ages. This procedure required neither much calculation nor wise foresight of our masters of the 12 th and 13 th centuries. Some Carlovingian edifices show traces of stucco on the vaults and even on the capitals.[1]

Note 1.p.474. The great capitols of the old northex of S. Remi of Rheims, those of the crypt of S. Lourent of Grenoble, and even capitols of the church of Issoire, are simple stone corbels covered by figures and ornaments in stucco.

Later stucco was no more than a very delicate overlay of ornaments; lattices, lozenges with flowers, on smooth surfaces to relieve their nudity.

STYLE. Style.

There is the style; there are the styles. The styles are t the characteristics that distinguish by them the schools and epochs. The architectural styles of Greek, Roman, Byzantine and Gothic, differ from each other in such wise, that it is easy to classify the monuments produced by those different a arts. It would have been more correct to say; the Grecian form, the Romanesque form o the Gothic form, and not to apply to these special characters of art the word style; but the usage being decided, we accept the Greek style, Roman style, etc.

That is not what is concerned here; we have emphasized in several Articles of the Dictionnaire the difference of style, that allow us to classify by epochs and by schools the architectural works of the middle ages.

We shall then only speak of the style that belongs to the art taken as a conception of the mind. Just as there is only the art, there is only the style. Then what is style? In a w work of art, it is the manifestation of an ideal established on a principle.

Style can also be understood ar fashion; i.e., the appropriation of a form of art to the object. In art there are then the absolute style and the relative style. The first dominates every conception, and the second is modified according to the purpose of the object. The style suited to a church cannot s suit a private habitation; it is the relative style; but a house may allow to be seen the imprint of an art expression (just as a temple or a barracks) independent of the object

and belonging to the artist or rather to the principle, that he has taken as generatrix; this is the style.

In the arts and particularly in architecture, vague definitions have caused many errors, and have allowed many prejudices to germinate, many false ideas to take root. One uses a word and each man attaches a different meaning to it. Reasonings that can never intersect arise on these badly taken bases, a adwance the questions not at all, embarras the undecided and narture idle minds. 2

Note 2.p.474. There moy be cited os on exomple one of those words loved by omoteurs of ort, ond which one cannot understond, for the good reoson thot it hos no sense. There is no ort critic who speoks of pointing, thot does not find o ploce for the word chiaoscuro. Whot ore likht ond shode? If it concerns the distribution of lights ond shodows in o pointing, why not simply soy modeling, o word thot energeticolly expresses the tronsitions from light to shodow? If it refers to the locol tone, os some oppeor to occept, i.e., the hormony odopted by the pointer, if not os color ot leost os the distribution of the light, why not soy hormony of lights or hormony of colors, whot everyone will understond? They prefer o vogue word, o n nonsense, thot posses for technics, but refroin from exploining it. This would not hove very great inconvenience, if this nonsense did not frequently cost into the minds of young ortists o vogue ond injurious uncertointy. We hove known pointers thot sought chiooscuro, something indefinoble, inoppreciable ond unknown, they lost their time ond judgment.

Every work produced by the human brain, in the domein of l letters as well as in that of the arts, can live only if it possesses what is called style.

The stwle belongs to the man and is independent of the object. For example, in poetry there is the thought or the impression and the manner of expressing it, of making it penetrate the soul of the hearer; this is style. Of a hudred witnesses of a fact, only one in relating it will produce a profound im impression on his hearers. Why? Because he has put style into his story. This style belongs to him, and yet to interest them requires the style, i.e., that it may act on all. Ten painters make the portrait of the same person in identical conditions. All these portraits resemble him. A single one recalls to per-

persons knowing the original, not only his material characteristics, but his features, his fashions, his mind, and his cheerful or melancholy character. This painter possesses style.

We return to our primany definition, that stwle is the manifestation of an ideal based on a principle. In fact, in the example just given, if the features, character and pose indeed belong to the original of the protrait, the operation that consists in becoming permeated by these qualities and attributes, so that the appearance of those qualities may be expressed on a panel; this operation pertains to the painter and is the r result of a principle to which he submits. We call that operation an ideal, because it is necessary for the artist to make of these qualities and attributes an entirety, a whole in which certain traits are reduced while others are placed in relief. We shall be pardoned here for taking an ordinary side of that faculty to make its value understood. If good, a caricature always has style, because the artist executing has taken the most prominent features and exaggerates them beyond all resemblance. All true artists have made caricatures, they are only the irregularity of a faculty belonging to poets and artists alone. One easily feels how narrow is the path between the absolute realism, that consists of photographing the object, idealism carried to caricature, and the platitude that sets itself to drag in a pretended classicism, and shelters itself behind its authority. The impression that an object produces on artists varies according to the faculties of each of them; then the expression differs; but those alone possess style, that cause the spectator to be penetrated by the impression that they have felt. The poet, painter and sculptor experience vivid, rapid and clear sensations; but these sensations proceed from the exterior and are only an impression; b before assuming an art form, that impression suffers a sort of gestation in the brain of the artist, that quickly assimilates it, in fact being a creation of the second order, that he brings to light by the aid of style. If this faculty of assimilation is lacking to the poet, painter or sculptur, their works ane only the reflection of a weakened sensation and produce no impression.

For the architect as for the musician, the psychological p phenomenon is different. Those artists do not directly receive

from a scene, an object or from nature a sensation suitable to be transformed into a work of art. From their brain must come this work, it is their faculty of reasoning that produces it in the embryonic state, which develops it by adding ao it a series of observations borrowed from nature, science and previous creations. If the architect is an artist, he assimilates those additions sought on all sides to develop his conception; if not one, his work is only a mass of borrowings from easily recognized originals; he lacks style.

For the work of art, style is what is the blood for the human body; it develops and nourishes it, gives it strength, health and duration; as one says: the human blood, although each individual may have different moral and physical qualities, one should say: the style, when it refers to that power that gives form and life to works of art, although each of those works may have its special character.

We do not have to estimate here to what point painting, sculpture and poetry are imitative arts inspired directly by forces outside of us and of which we are witnesses. It suffices to state -- what we believe that no person will dispute -- that architecture is not an imitative art; external effects can have only a secondary influence on its development. The art of architecture is a human creation; but such is our inferiority, that to obtain this creation, we are obliged to proceed as nature does in her works, by employing the same logical elements; by observing the same submission to certain laws and the same transitions. The day when the first man traced a circle on the sand by the aid of a stick swung around an axis, he did not invent the circle but discovered a figure eternally existing. All his discoveries in geometry are observations and not creations; for the angles opposite the vertexes only waited until men had proved their property of being equal to each other.

Architecture, that human creation is then in fact only an application of principles born outside of us, and that we appropriate by observation. The force of terrestrial attraction existed in the universal order, we observed its laws and have applied them. It is the same for all parts of this art; the proportions and even the decoration must spring from that great universal order, whose principles we appropriate, as far

as our imperfect senses permit. Thus it was not without reason that Vitruvius said, that the architect must possess nearly all the knowledge of his time, and that he placed philosophy at the head of this knowledge. Now among the ancients, philosophy comprises all the sicences of observation in the moral as well as in the physical order.

Then if we penetrate a little into the knowledge of the great principles of the universal order, we very quickly recognize, that all creation develops according to a logical procedure, and that to exist, it submits itself to laws preceding the creative idea. Thus indeed one could say:- "At the origin existed numbers and geometry." The Egyptians, and after them the Greeks, had fully understood this; for them, numbers and geometrical figures were sacred. We think that the style, never lacking in their art productions, is due to this religious respect for the principles to which universal creation first submits, which is the style preeminent.

But in questions of this order must be brought the most sensible demonstration. Further, we do not occupy ourselves here with philosophy; nothing else is concerned, than to seize the ground principles, the simplest principles by the aid of which style permeates the works of architecture.

Men would sometimes persuade themselves, that the artist p possesses at birth the faculty of producing works of style, and that it suffices him for that to leave himself to a sort of inspiration, of which he is not master. That idea is a little too general and pampers vague minds, but does not seem to have been accepted in times, that could produce the works most remarkable in style. On the contrary, men then believed that the production of the most perfect art -- the faculties of t the artist being assumed, as well understood -- was the consequence of a profound observation of the principles on which art can and should be first based.

We leave to poets and painters to decide of what is called inspiration can or cannot occur without profound and long observation; but for architecture, it is compelled by the scientific side, by the emperious laws that dominate it, to first seek the element, the principle that must serve it as basis, and to deduce from it with rigorous logic all the consequences. In truth we can have no pretense of proceeding by virtue of a

power stronger that that of creation, we can act only by observing the laws that it has fixed. Now when one recognizes that nature, all inspired as it is assumed, has not combined two atoms without submitting absolutely to a logical rule, that h has proceeded in mathematical order from the simple to the c compound, and witnout abandoning for an instant the principle accepted at first, we should indeed be allowed to smile, if we see an architect await inspiration without the intervention of his reason, that alone however can allow himh to imitate quite afar that logical procedure followed in the creation of our globe, without going farther.

Certainly our globe is only a poor little grain of dust, b but finally we live on it, we can see and observe it; and however infinitely small an object in immensity, we recognize t that to form it, nature has not reasoned badly. We shall be pardoned this digression, that however is only apparent, for what we shall say is intimately connected with out art, and particularly to our art during the middle ages.

The problem to be solved was this:- "given a spherical mass, or nearly so, in the state of a burning liquid, to solidify i its surface by cooling, i.e., by gradual contraction and condensation, so as to form around the spheroid in fusion a homogeneous and sufficiently resistant crust."

It is indeed here the case of stating that before the problem was set, geometry existed, for the problem is solved according to its laws. Note first that nature did not find the quadrature of the circle insoluble or absurd. It has in its hands the means that we have taken from it by the observation of its own laws. For it as for us, a circle is a circle, and if it be necessary to cover a spheroid by a crust, a sort of solid pavement, it proceeded as we should proceed, by juxtaposition of a body lending itself to that purpose. The question was to f find this body, this unique body of a single kind, possessing absolute properties of resistance. Nature is at work and her deductions are connected in an order of inflexible logic. She traces a circle (Fig. 1); a sole figure unable to deform itself, whose sides and angles are equal to each other, and consequently whose resistance is equal on whatever side it is placed, is inscribed within this circle; thes is the equilateral triangle. She takes a sphere, and within this sphere by induction she i

inscribes a pyramid whose four faces are equilateral triangles, i.e., a solid that cannot be deformed and whose properties are the same, on what one of its four faces it is placed. Here is the solid found; equal sides, angles and resistances. With this unit, she is going to form the solid crust of the incandescent sphere. And in fact this solid can lend itself to that function.

Two equilateral triangles with a common base (at A, Fig. 2) give a lozenge; equal sides, angles a are obtuse (120°); angles b acute (60°). By the aid of these lozenges developed at B is obtained the rhombohedron C″, C is obtained; i.e., a body composed of two pyramids e, whose four faces are equilateral triangles, and whose middle part g has a common base f, from which rise two opposed triangles whose faces are equilateral triangles. Here then with a single figure , the equilateral triangle, is obtained a body, whose properties have a prodigious extent. First let us consider well this body C; does it n not present to the eye a combination of six similar meshes, able to attach itself to three networks, intersecting and penetrating, thus lending itself to cover curved surfaces?

Four intersecting rhomboids form two pyramids composed of intersecting equilateral triangles, i.e., a solid is formed of a star with eight similar points, each of whose points is itself a pyramid composed of equilateral triangles (see Fig. 3). This solid, whose middle part a is that of the Rhombohedron, inscribes the six points of the bases of the two pyramids intersecting in a hexagon b; it inscribes its eight points in a sphere and in a cube (see Fig. 4). These bodies composed by the aid of a single figure, the equilateral triangle, then enjoy very extensive properties. If we take the trouble to examine the formation of the first terrestrial layer crystallized, granite, we see that it is only composed of juxtaposed rhombohedrons (at a, Fig. 5). Or if we consider the basaltic eruptions solidified by contraction, we see that they give prisms of hexagonal section b, that are only a derivative from the rhomboidal form.

The reticulated faces of the rhombohedron lend themselves t to covering a spheroid much better than cubes could do. The junction planes of these rhombohedrons are not normal to the terrestrial curve and would have been the junction planes of

of cubes, which would have formed a juxtaposition of truncated pyramids with square bases. Not being normal to the terrestrial curve, these rhombohedric planes resist better an internal or pressure toward the exterior for (Fig. 5) it is clear that bodies arranged as those indicated at C cannot retain a nucleus tending to escape, as can bodies arranged as shown in sketch D; now this arrangement is precisely that of the granitic rhombohedrons. It is useless for us to extend farther on these geological formations; it is only essential to cause to be understood how the first creative system of the globe that we inhabit, -- and very certainly of all others scattered in space, for the equilateral triangle on Saturn cannot be different from that designated here, -- proceeds according to the rigorous application of a principle, is alone possible to admit. If we follow all the phases of terrestrial organic and inorganic creation, we soon recognize, en all its most varied works, and even those most different in appearance, this logical order that starts from a principle, from a law established primarily, and that never changed. It is to this method t that all these works owe the style by which they are permeated. From the mountain to the smallest crystal, from the lichen to the oak of our forests, from the polyp to man; everything in the terrestrial creation possesses style, i.e., the perfect harmony between the result and the means employed to obtain it.

Here is the example that is given to us, that we should follow, when we pretend to create by the aid of our intelligence.

What we call imagination is but one side of our mind. One could say that it is the part of it, which still lives while the body sleeps, and which presents to us in dreams scenes so eccentric, displaying to us impossible and disconnected facts. This part of ourselves does not sleep in its turn, when we are awake, but is regulated by what we call the reason. We are then not masters of our imagination, since it constantly disturbs us, diverts us from the present occupation, and because it s seems to escape and stray at its pleasure during slumber; but we are masters of our reason; reason belongs to us, we train it, and after constant exercise, we succeed in making it an attentive chief, who regulates the machine and gives to its products life and duration.

Then while recognizing that a work of art can be on the ex-

embryonic state in the imagination, it cannot be developed and attain life without the intervention of the reason. The reason supplies that embryo with its necessary organs, establishes the relations between the parts, gives it in architecture what are termed proportions. Style is the visible mark of that accord, of that unity of the parts of a work; it is then derived from the internevtion of reason.

The architecture of the Egyptians and that of the Greeks p possess style, because they are deduced with inflexible logic from the principal of stability on which they are based. One cannot say as much of all the Roman monuments of the empire. The architecture of the middle ages at the moment when it abandoned the debased traditions of antiquity, i.e., from the 12 th to the 15 th centuries, possesses style, because that perhaps more than any other, it proceeds with that logical o order, which we see in the works of nature. Thus, just by seeing the leaf of a plant, one deduces the entire plant; the bone of animal gives the entire animal; by seeing a moulding one deduces the architectural members; [1] an architectural member gives the monument.

Note 1.p.482. In examining Art. Trait, it will be recognized, that what we say here is not an exaggeration.

If the natural creative force has been unable to obtain general forms in the work executed by the aid of parts; if (without speaking of organized beings), to make the primitive crust of our globe, it has proceeded by juxtaposition of bodies crystallized in a single form; and if the masses obtained are only the rigorous consequences of the part, for a stronger r reason, we that only examine the primary material to employ it for our uses, should only use it according to its form and properties. Up to a certain point we can force the primary materials, for example the metals; we can subject it to arbitrary forms. But the stone and the wood, we must take as nature supplies them, place them according to certain laws de determined by the formation of those substances, and consequently to conceive a structure that accords with their properties. Style is only obtained on these conditions, viz:- that the material being given, the art form that clothes it is only the harmonious result of its properties adapted to the purpose; that the use of the material may be proportional to the

object, In fact, the proportions are relative and not absolute; not relative as t:(number, but relative according to the material, the object and its purpose. In the art of architecture, one cannot establish this formula; 2 is to 4 as 200 is to 400; for if on piers 6.6 ft. high you can place a lintel 13.1 ft. long, on piers 656 ft. high you cannot place a lintel of 1312 ft. Changing the scale, the architect must change the fashion, and the style precisely consists in selecting the fashion suited to the scale, taking this work in its widest acceptation. The Greeks did not admit what we call scale, [1] but they accepted the relation of numbers. [2] But they erected only small m monuments.

Note 1.p.488. Art. Echelle.

Note 2.p.483. On this point see the remarkable work of M. Aurez.

If the masters of the middle ages accepted a single module related to the dimensions of man, they modified the scale of proportion according to the dimensions of the edifice. According to these dimensions, they adopted various textures and f different organisms; consequently different appearances that have the style, because that all are only the consequence of an application of a true principle.

A comparison will make known the profound differences that separate the architecture of the middle agesfrom that of Grecian antiquity at the moment of its development. The Grecian column, a vertical support, belongs to the order, i.e., it is always found in nearly identical proportions to the members that it supports; if the lintel or rather the entablature increases in volume, it is just that the column supporting that member increases in strength in the same proportion; because the lintel cannot exceed a certain dimension. But the arch be being adopted and consequently vaults, the column no longer forms a part of an order, and is only the result of the new organism. The adoption of the lintel not permitting one to exceed a certain width of intercolumniation, -- for one cannot set lintels of 32.8 ft. span, -- it was logical to retain for the column a diameter in the ratio of that intercolumniation,-- and consequently to its height; but the span of the arch being almost indefinite, it would have been illogical to fix the d diameter of the column with reference to its height or to the

has wings to fly, or that it flies because it has wings. It flies and its wings are a perfect machine permitting it to fly. The machine is the exact expression of the function that it fulfils; we other artists, we have no need of going farther.

If then by chance we find on our way architectural works, that fulfil these conditions of harmony between the form, the means and the object, we say:- "These works have style," and we are authorized to speak thus. What would then be stale if it were not a sensible emanation from those qualities? Does it reside by chance in a certain accepted form, whatever the object, means or purpose? Would it be the soul of that form, never leaving it? What! An organized being, a living animal whose habits and surroundings you change, loses that harmonic quality of style! The bird of prey that you shut up in a cage is no more than an awkward being, depressed and deformed, although it carries with itself its instinct, appetite and qualities; and the column of a monument, which in itself is but a crude form, would you think tha in displacing it, in placing it no matter where, outside of causes that determined its proportions and reason for existence, it will retain its style and charm, that caused it to be admired where it was erected? But this charm and this style belong precisely to the place that it occupied, to what surrounded it, to the entirety of which it was a harmonic part!

Let the Parthenon be rebuilt on the hill of Montmartre, we indeed wish it, the Parthenon with its proportions, its outlines and proud grace, but without the Acropolis, the sky, horizon and sea of Attica, and without the Athenian people; yet this would always be the Parthenon. This would be like the lion placed in a zoological garden. But tear from the Parthenon its Boric order and place that spoil against a wall p pierced by windows, what name should be given to that barbarous caprice? What then becomes of the style of the Grecian monument? And what we say of the Parthenon, cannot the same be equally said of all those borrowings made nearly by chance? Does one believe that the style of an edifice crumbles with its members? That each one of these retains a portion of the style that the entirety possesses? No; in erecting monuments with scraps gathered from all sides, in Greece, Italy, in arts distant from our times and our civilization, we collect only

members of corpses; tearing those members from the corpses to which they belonged, we take away their life, and we cannot recompose with them a living being.

In the created order that surrounds us, and that is placed at our disposal, so to speak, all that man touches, arranges and modifies, loses style, unless he himself can manifest style by introducing order from his own mind into the midst of the disorder, that he has produced. When man makes a garden, one of those termed English, he takes from nature its charm, its always logical sense, to put in its place his caprice; s style disappears. But if in laying out a garden, man causes his own genius to intervene, if he employs natural products as materials, and he invents order that does not exist in nature, for example, straight avenues, quincunxes, symmetrical cascades intermingled with architectural forms, he causes nature to lose style, but he has been able to substitute for it (depending on the principles that he has established) what h his own genius sometimes knows how to produce. For a stronger reason, if man touches the work of man, if he desires to take away parts of it, as one takes materials from a quarry or trees from the forest, he removes style from that work. To cause the style to reappear requires a new principle like in inspiration, to animate these materials.

The masters of the middle ages well understood this. They had at their disposal Romanesque art, the descendant of the are of the empire, refined by Greco-Byzantine additions. This art lacked neither grandeur nor originailty. Western men had known how to make it almost an indigenous prodult; Yet after the grand flight that it made after the first crusades, that art had very quickly reached a certain relative perfection, but was at the end of inspiration. It turned in a small circle, becaause it did not rest on a new principle, entire and absolute, and it was restricted to study the form without occupying itself too much with the basis. Men built better, they even came to construct according to new methods; but the principle of construction was not modified. The ornamentation was more elegant, the mouldings were delicately traced, but that ornamentation did not rest on any new observation, and those mouldings did not clearly indicate their destination. The Romanesque architects purified their tastes, sought the better and

the delicate, refined the form, but they could not find style, which is the mark of the idea fastened to a generating principle, in view of a clearly defined result. This generating principle is the use of the material according to its properties, allowing the means to appear always, as in the human body one distinguishes the structure of the skeleton, the attachment of the muscles, and the seat of the organs, the form being the result of that use. The result is the entirety of the monument, as well as each of its parts, and responds exactly and without any concession to the purpose.

So this art of the French school constituted about the end of the 12 th century in the midst of the sketched civilization of the middle ages, was a confusion of ancient ideas with new aspirations, like a flourish of trumpets among the deep noises of a multitude. Everyone pressed around that nucleus of artists and artisans, that had the power to express the long repressed genius of a nation. Nobility, clergy and citizens lavished their treasures to build churches, palaces, castles, mansions, public establishments and houses according to the new principle adopted, and hastened to pull down their earlier structures. It does not appear that anyone then thought of obstructing those artists in the development of their principles. In fact, min obstruct artists only when they do not have them.

A principle is a faith, and when a principle is based on reason, one does not have against it the arms that can be u used against irrational faith. Then undertake to shake the faith of a geometer in geometry!

The phenomenon that produced our architecture of the middle ages, so strongly impressed with style, is the more remarkable, in that according to the order of things, style is strongly impressed in the primitive arts, to be weakened successively as these arts perfect the execution. Now it appears that our lay architecture of the 12 th century could not present the characteristics of a primitive art, since its point of departure is an art of the dacadence, Romanesque art. But it is there necessary to beware of confusing the form with the principle. If from the Romanesque to what is called Gothic art, there are transitions in the form, there are none in the principle of construction.

Introducing a new principle of construction, the style pro-

proceeded according to a law that permits no exceptions. In that,art proceeds like nature herself, style in it being the corollary of the principle. [1] It is entirely simple as in the primitive civilizations, all that emanates from man has style; religion, costumes, manners, arts and clothing, are impregnated by that flavor borrowed from the most naive and most direct observations. The mythology of the Vedas and that of the Egyptians, starting from the observation of natural phenomena, a are permeated by especial style. The arts expressing that mythology possess style. But that a complex state of civilization, a mixture of earlier anf confused remains, can cause the revival in its art expressions, of a style dead for centuries, that is a phenomenon scarcely usual, which requires a powerful effort to produce, a great movement of minds. It is evident to us that this movement occurred in only one class of society, that it was neither noted nor appreciated by the other classes, and this explains why it remains ignored by the greatest number, even today. The art of the lay school was then a sort of initiation into truths scarcely suspected, a return to a primitive state, so to speak, in the midst of the falling and disorder of confused traditions, a new seed cast into the bosom of a ground encumbered by products of all sorts, mutilated and decaying on each other. The young plant was scarcely seen at first, but was cultivated with persistence, and soon rose above all others, had its charm, its pose, its flowers and f fruits. It covered for a long time the sad remains that lay beneath its shade.

Note 1.p.487. We sufficiently emphasize elsewhere the novelty of the new principle of construction established by the l lay French school of the 1* th century, for it to be necessary to enlarge here on its essence. Besides this principle is summarized in a single word; equilibrium. (Arts. Architecture; Construction).

One will perhaps find singular the opinion expressed here by us on the formation of an art within one class of society, without the participation of the others, of an art cultivated by a sort of freemasonry, developing without obstacles and retaining the vigor of its principles in the midst of monastic establishments, which until then had been the masters of instruction; of a secular clergy tending to omnipotence, of a dis-

distrustful feudal nobility, and of a rude and ignorant people.
But to the antagonism of these different elements, the men of the principles owed the power to develop them. Feudal France in the 12 th century found itself in a situation, that had not its like in Europe. In the other countries, the balace b between the powers and the social elements was less equal; a antagonism did not produce opposed forces in a state of permanent struggles. Here were preserved municipal traditions, th there was pure feudalism, elsewhere theocracy, or indeed a s sort of monarchy tempered by civil liberties. In these different States art was a language much better understood than it could be in France. In the midst of the quasi republican institutions of Italian municipilities, art was a public affair as in the cities of ancient Greece. One was artist or artisan and fulfilled public functions. Art was understood by all, honored, envied, extolled or prosecuted. Under an absolute f feudal rule, the artist was nothing but one subject to levies, a villein, colonist or serf, mechanically executing the orders of the master. Under a theocracy addicted to hieratism, he co could neither develop nor change, but even by that, he was u understood now as before. In a country enjoying more liberal institutions, as in England, for example, there existed among the different classes of soliety relations of frequent interests, which causes that one class nearly understood another. But in France, at one side was the feudal nobility retaining its caste prejudices, based on the right of conquest; on the other being a contested sovereignty seeking its centre of power sometimes in the nobility, sometimes in the communes, occasionally in the higher clergy. Then a numerous people had not entirely forgotten its municipal liberties, always ready to revolt, bold, industrial and warlike; beside it being a secucar clergy jealous of the predominance of the monastic establishments, no less jealous of the feudal nobility, seeking a point of support in the midst of the cities and dreaming of a sort of clerical oligarchy with a powerless sovereign, but surrounded by great prestige, a sort of doge with a senate of bishops. In a society so divided, who could occupy himself with art? The monastic establishments? This was not their m means of action in the least. But again the communes, the old Gaulish spirit resumed its powers continually in revolt, indus-

industrious and rich, in spite of their struggles against the feudal powers, these communes were grouped in guilds, formed secret assemblies, since their halls for the citizens were t torn down, and meetings in public places were forbidden to them. In those centres of municipal liberties were formed lay schools of artists, on the day when they were sufficiently s strong to work without recourse to monastic instruction, the bishops believed that they found there the pivot of their projects against,the power of the abbeys and of lay feudalism, and turned to these schools to build the monument of the city, the cathedral. [1] Who would then have been able to appreciate the intellectual labor, the development of art made in these assemblages of citizens, artists and artisans? They were instructed in darkness; when they built in the open day, their monuments were mysteries to all, except to them; and just as in the individual work the style only shows itself if the artist lives outside the world, in a general expression of art style is like the perfume of a primitive condition of minds, or of a concentration of ideas, of tendencies belonging to a class of citizens, that has known how to create a separate world. [2]

Note 1.p.488. In Art. cathedrale see the history of the construction of those edifices in the 12 th and 13 th centuries.

Note 2.p.489. There is no example that an artist has put into his works what is called style, and at the same time has l lived the life of the world in the complex social and diffused state of our modern society. There is in style something rough tho is soon smoothed and removed by contact with the world, such as the times have made it. Thus the quality lacking in works of art of our epoch, often very remarkable, is style. Mannerism replaces it, and even among artists mannerism is o often taken for style.

The school that akes an absolute part and at first establishes the foundations of its art on the laws of equilibrium not before applied to architecture, on geometry, on the observation of natural phenomena; which proceeds by way of crustallization, so to speak; which does not stray from logic for an instant; that desires to substitute principles for traditions, and goes to study the flora of the fields with minute care, to derive from it an ornamentation belonging to it; which from the flora and even the fauna by the application of its logical procedure,

attains to forming an organism of stone possessing its laws just like a natural organism; this school did not have to occupy itself with style, since the methods then as always were those, which developed are the essence itself of style. In f fact on the day when the artist seeks style, it is because s style is no longer in the art. It is better to take up an art, that by itself and by its construction is impregnated with st style; and every time that architecture is logical and true, subject to a principle from which it does not wander for an instant, that it is the absolute and rigorous consequence of that principle, however mediocre the artist, the work always has style, and that architecture remains in future ages a subject of admiration for some, but of importunate comparison for others. Is it indeed also to the last feeling that must be referred the reprobation under which men have long pretended to overwhelm the architecture of the middle ages? Its unity of style, its freedom of charm, the mysteries of its texture, were as many reproaches addressed to the artists, who no longer desired to regard architecture merely as a sort of game with forms borrowed from imperial Rome or from the Renaissance of Italy, without understanding them. Rather than seek the pr principles of architecture of the middle ages, and to take up its applications that can always be new, one finds it simpler to affect disdain for that art. The roughness of the style w was barbarian, the science of its combinations was only confusion. But the nature of these reproaches even indicate the qualities that distinguish that art; and one cannot demand from artists for whom architecture is no more than a covering without relation to the object, without meaning, ideas or logical cohesion, to comprehend and estimate the works of masters, who never place a stone or timber, neither trace a moulding, unable to give the reason for what they do.

To invent a free and extended system of construction, applicable to all programmes, permitting the use of all materials, lending itself to all combinations, the most vast as well as the simplest; to clothe this structure with a form that is on only the expression of the system; to decorate that form without ever contradicting it, bu on the contrary by emphasizing it, explaining it by combinations of profiles traced according to a geometrical method, which is only a corollary of that a

applied to the general conceptions; to give to the architecture, i.e., to the structure clothed with an art form, proportions established on principles of stability, simplest and m most comprehensible for the eye; to enrich the masses by an ornamentation systematically borrowed from nature, after very delicate observation of the plant and animal organisms; finally to apply to this complete architecture statuary, but subjecting it to monumental principles requiring it to belong to and form a part of the monument; in brief, this is what our lay school of the end of the 12 th century did. Style is inherent in the art of architecture, when that art proceeds according to a logical and harmonic order, consistently from the whole to the details, from the principle to the form; when it leaves nothing to chance or caprice. For example, capribe alone guides the artist, if he places an order before a wall that does not need it, or gives to buttresses made to abut, the f form of a column intended to support; it is caprice that pierces in the same edifice openings with round arches and those with lintels; that inserts projecting cornices between the s stories where no roof gutters exist; which erects pediments over windows opened in a solid wall; which intersects a story to open a doorway of useless height, if one has regard to persons or carriages passing under its arch, etc. If this be not caprice, it is what one vulgarly calls taste, which leads to things contrary to reason; but is it not a proof of taste in architecture, that it is not based on reason, since this art is destined first of all to satisfy perfectly definite material needs, and that can only employ materials with properties resulting from laws, to which we must indeed submit?

To believe that there can be style in architecture in works, where all remains unexplained and inexplicable, where the form is only the product of memory charged with a quantity of motives chosen at right and left, is an illusion. Jus as well say that there can be style in a literary work, whose chapters and even phrases are merely a loose collection borrowed from ten authors writing on different matters.

But without reference to those sad and expensive abuses, if we compare our architecture of the 12 th and 13 th centuries with another architecture permeated by style, when it acts freely in accordance with its genius, the Roman architecture

of the empire, we shall see that this quality is more vividly impressed in the works of the middle ages. The harmony is more perfect in the latter, a more intimate connection between the form and its decoration.

Let us take an example. Here at A, Fig. 6, is an impost of Roman cross vaults on a capital of a column, on a rigid vertical point. In this architectural member, what is the utility and reason of the entablature B? That is a matter of taste, some one will say. But my reason and therefore my taste are shocked to find between the supporting member C, the capital of the column with a sufficient crowning, the enlargement, an entire arrangement of architrave, frieze and cornice, whose utility and charm I cannot comprehend, sence that arrangement is superfluous. For what good is that projection a of the cornice? Cannot the impost of the vault be borne on the capital just as well? If these projections are intended to bear the carpentry centerings that serve to build the vault, much importance is given to an accessory object, and which should have only a temporary character. Headers set in the vault at d, and that could be cut off after the completion of the construction, would have fulfilled the purpose just as well.

Besides, why such apparent effort, to which the decoration lends such great value, to bear the imposts of a vault, whose pressure is no vertical, but oblique, and penetrates into tehe mass of the structure? So that even by the effect of its curves, the vault does not seem to rest on these projecting members? If on the contrary, we examine the springing of a vault according to the system adopted at the end of the 12 th century (see G), does not the supported part rest in the clearest way on the group of little columns and the common capital? Is there a single useless member, whose function and reason cannot be seen at once? The problem to be solved is identical in the two cases. Of the Roman architect and the French master, which has solved it in the most satisfactory manner? If style results in great part from the perfect concord of form and p purpose, where is it found in the two examples?

In the Roman arrangement that we give here, style is wanting. As it always happens, the Roman found style where he did not seek it; in great works of public utility; for example in the amphitheatre, where all was sacrificed to the execution of a

well written programme; in the halls of the simplest baths, omitting the borrowed ornaments; in those wide porticos erected to shelter the multitude. But when the Roman pretended to make himself an artist like the Greek, when he stole from Greece an order without comprehending its primary signification, to place it without reason beneath the impost of a vault, or as a buttress along a wall, his architecture lacked the first quality of style, which is clarity, the correct application of the form to the object. The ruins of monuments truly Roman, i.e., edifices on Roman principles, have style. Restore most of those ruins, replace the orders, the frames and bonds, t the ornaments removed by barbarians or by time, you will see the style suited to those grand structures effaced, in the measure that you replace there those additions borrowed from another art, order of ideas and principle of construction.

Style is the result of a principle followed systematically; then it is only an unsought emanation from the form. Every labored style is termed mannerism. Manner grows old, but style never.

When a people of artists and artisans is strongly bermeated by those logical principles by which all form is the result of the purpose of the object, style shows itself in the works from the hand of man, from the most ordinary vase to the monument, from the housekeeping utensil to the richest furniture. We admire that unity in good Grecian antiquity, we find it a again in the best time of the middle ages in another path, because the two civilizations differ. We cannot possess the style of the Greeks, because we are not Athenians. We cannot recover the style of our ancestors of the middle ages, because the times have advanced; we can only affect the manner of the Greeks or that of the artists of the middle ages, in brief, m make imitations. But if we cannot do what they have done, we must at least proceed as they did, i.e., become permeated by the true and natural without our seeking it.

Wha especially distinguishes the architecture of the middle ages from those in antiquity, that are worthy to be regarded as art types, is freedom in the use of form. The principles adopted, though different from those of the Greeks and even of the Romans, perhaps are followed with more rigo : but the form assumes a freedom, an elasticity previously unknown; or

more truly, the form moves within a field much more extended, either as a system of proportions, means of construction, or as to the use of details borrowed from geometry, the flora a and fauna. The organism of the architecture is developed, so to speak, it comprises a greater number of practical observations, is more scientific and complex, hence more delicate. T This organism then enters the modern path, and one will confess that it is very strange that it is rejected as aged, to resume those still more removed from the modern spirit. But in the application of architecture, all is contradiction today, and to take things by their true side, what is most frequently sought, is the easy current that carries us gently past the principles established by reason without ever striking against them.

For many persons, style in architecture consists only in an ornamental envelope, and even among artists, some sincerely believe it to make a work of style, because they have stuck some mouldings or ornaments, Etruscan, Greek, Gothic or Italian Renaissance, on a structure having no affinity with the arts of this time, to an edifice erected on entirely modern principles. Certainly, the knowledge, study and even the use of ornamental parts of an epoch preceding ours, can be recommended, but not therein is style manifested. Style resides far more in the principal lines, and in a harmonious entirety of proportions, than in the vestment covering an architectural work. Likewise in the work of a painter, style is manifested in the choice of lines, in the entirety of the composition, in truth of pose, much more than in the archaic research of certain draperies, in the correctness of clothing and accessories. It is singular that this truth, incontestable in regard to p painting or sculpture, is scharcely seen if it concerns architecture. That proves to us now men generally ignore the most elementary laws of this art, and how much they have falsified the most natural principles.

The middle ages were in advance of antiquity in certain ways; in these ways must they resemble it. They place the idea above all doctrine or tradition; pursue the idea with fanaticism, often blindly. But to pursue an idea even when foolish, impossible to realize, is not to turn the back on progress. The alchemists sought the philosopher's stone, but opened the way

to chemistry. The nobles and villeins, who threw themselves into the Orient in the train of Peter the Hermit, made an immense step toward civilization, and notably of the arts. Chivalry, so much ridiculted, sowed the seeds of what we have retained of the best in our society. S. Francis of Assizi was a passainate lover of nature and of the creation, passing hours in contemplatian before a flower o a bird; he regarded himself as a part of a whole, and did not separate man from the rest of the universe. Antiqui y shows us nothing like this: among the Egyptians and the Greeks, still less among the Romans, were no alchemists, no soldiers going on campaign to follow an idea, knights or S. Francis of Assizi. The narrow egotism of antique man is depicted in the arts of Egypt and if G Greece. It is perfect, complete , exact and clear, but it is finished. Those arts have no future, and if they move us, this is because our imaginations as modern men refer us to affairs and events which those monuments witnessed. It is necessary to be educated to really enjoy the sight of an antique monument, to feel emotion before those works, that promise nothing more than they show; the poorest monument of the middle ages causes one to dream, even an ignorant person. That one may not be deceived, we nowise pretend to establish here comparisons in favor of one or the other of those arts; we do not plead, we seek to emphasize the qualities distinguishing those arts, a and from what elements both have derived the style by which they are permeated. The day that everyone will be convinced that style is only the natural and unwrought perfume, a principle, an idea followed according to the logical order of the things of this world; that the style develops the plant, that grows according to certain laws, and that this is not a sort of spice taken from a sack to sprinkle over works, which by themselves have no flavor; that day we can be assured that posterity will accord style to us.

From all preceding it results, that we shall not establish the rules according to which the artists of the middle ages have placed style in their works. Style is found there because the form given to the architecture is only the rigorous consequence of the principles of construction that proceed:-- 1, from the materials to be employed; 2, from the mode of placing them in the work; 3, from the programmes to be satisfied; 4,

from a logical deduction from the whole to the details, quite similar to what is observed in the order of created things, where the part is complete like the whole, and is composed li like it. Most Articles of the Dictionnaire sufficiently emphasize the logical spirit, the unity of principle that directs the masters of the middle ages. It is not their fault if we have put unity into uniformity, and if we architects are still to see only confusion and disorder in an organism, of which they have not studied the phenomena and the methodical connection. We say organism, for it is difficult to give another na name to this architecture of the middle ages, that develops and advances like nature in the formation of beings; starting from a very simple principle, that it modifies, perfects and complicates, but without ever destroying the primitive essence. It is not the law of equilibrium applied to that architecture for the first time, which produces a sort of life in Those m monuments by opposing in their construction opposed actions, pressures against pressures, counterpoises to overhangs, decomposing loads to transfer them far from the point where they hang vertically; giving each moulding a purpose in accord with the place it occupies, to each stone a function, so that one of them can be omi ted without compromising the entirety. Is not that life so far as permitted to man to communicate it to the work of his hands? Science, ingeniosity and all that will object, but not art. May be; but what is then the art of architecture? Is it then only traditional or an arbitrary form, on or that other? If traditional, why one tradition rather than another? If arbitrasy, it no longer has principles nor laws; it is no longer an art, but the most costly and least just of all caprices.

In the edifice, so that each stone fulfils a useful and necessary function; that eac moulding has a precise purpose, and that its form indicates that purpose; that the system of proportions adopted is derived from geometric harmony; that the ornamentation is derived from an application of the flora, according to the observation as true as ingenious; that nothing be left to chance; that materials are employed according to their properties and indicate those properties by the form given to them; does it follow that art may be absent and that science alone is visible? Let us admit if desired, that all

those material facts cannot constitute an art. Is that all? Is there not in these structures an idea? And is that idea an impenetrable mystery for us, who are its children? The lay m masters first attempted what we are doing, if not in architecture, so greatly delayed by the academic control, at least in industry, in naval constructions, in our great works of public utility; they would subjugate the material, supple it in such fashion that all becomes possible. On slender supports, they vault wide spaces. They cause light to penetrate everywhere into great interiors, and that light is the decoration, the painting; no more walls, but translucent tapestries. Compelled by the customs of their time to construct habitations of nobles, that are at the same time fortresses, subjecting the form to these two distinct requirements, they have known how to f find an art sufficiently flexible to compose a homogeneous e entirety from those incongruous elements. Their castles are fortresses and habitations; the programme is inscribed on their facades.

One of the marks of style is at first the adoption of the form suitable to each object. When the architectural work indicates clearly the use for which it is intended, it is very near to possessing style; but when further that work with those surrounding it forms a harmonious whole, surely style is found there. Now it is evident for those that have observed monuments belonging to a single period of the middle ages, that there exists an accord between these different expressions, and a harmony. The church does not resemble the city hall; the latter cannot be confused with a hospital, nor the hospital with a castle, the castle with a palace, nor the palace with the house of the citizen; yet between these different works whose purposes are so clearly indicated subsists a connection. Those are indeed different products of a social condition, master of its art exfression, and which never hesitates in the choice of its language. Yet what variety in that harmony! The artist retains his personality. All speak the s same language, but what fertility in the manner! This is because their laws are not established on accepted forms, but on principles. For them a column is no a style, that by tradition must have in height a certain number of times its diameter, but a cylinder whose form must be calculated according to what

it supports. A capital is not an ornament that terminates the shaft of the column, but a corbelled course placed to receive the different members that the column must supports A doorway is not an opening with height proportional to its width, but an opening made for the number of persons, that pass under its lintel at a time. But why insist on the application of principles developed so many times in the Dictionnaire? Those principles are nothing but sincerity in the use of form. Style develops the more in works of art, as they vary less from just, true and clear expression. To find the just expression, to be clear, are French qualities that we possess in the arts of form as in discourse. Our Renaissance architecture in the hands of skilful masters, and in spite of the deteriorated elements from which it came (an affair of the court and of fashion), still retains qualities natural to us. The works of Philibert de l'Orme are the proof of this. There is a master, who in n his portico of the Tuileries takes an antique order engaged to arcades like buttresses. But at first he does not make engaged columns, he places pilasters or entire columns, and these project from the arcade of the portico and support balconies, the projections of a terrace to the garden, a sort of tr trunk. He then had a motive for these columns, they served for something, and were not then a mere decoration. This order was not then intended to support the unfortunate story since superposed, and whose least defect is to make the arrangement of the ground story incomprehensible. The order being adopted, let us examine with what art our master constructs it, gives it a style, the style, that which results from a just application of true principles. Philibert de l'Orme cannot or deems it unsuitable to erect monolithic Ionic columns. He constructs them with a series of drums. He frankly accents their structure, separates the drums out in the thick beds of stone from S. Leu by low courses of marble forming rings or bands encircling the shaft. On these marble drums he sculptures delicate and scarcely projecting ornaments, as if to emphasize the value of the material. On the stone drums are flutes, and beneath the capitals, to arrange the transition from the coldness of the shafts to the richness of the entablature, he places laurel branches before the flutes.

That some apply the orders with this sagacity, subordinating

them to a mode of construction imposed by the material, we . admit; that does not prevent art of invention from intervening, and certainly no person will contest the elegance of this fragment of architecture, particularly il in thought all the barbarous exaggerations that crush it are removed. But if one today takes this charming motive, without taking into account t the reasons causing it to be adopted, then style disappears. There remains only an imitation withou intelligence of the original, a vague and confused translation of a simple, logical and clearlanguage. To possess style, the work of the architect cannot be without ideas during its conception, and the intervention of reason during its development. All the splendors of sculpture, the richness and profusion of the details, cannot fill the lack of ideas and the absence of reasoning.

SYMBOLE. Symbol.

An image idealizing the qualities of a personage, matual p phenomena, or concealing a metaphysical idea; [1] it is the poetic form graved in the minds of a people, better than can be made a dry definition. Jesus compares himself to the shepherd, and painters of the first times of Christianity represent him surrounded by sheep. This symbolical image of him says more than all reasonings tending to prove that God regards men with the care of the shepherd watching over his flock.

Note 1.p.498. For example, in the Catholic Church the altar cloth, tabernacle, fire, incense and chalice, are symbols under which is concealed a metaphysical idea.

Symbolism belongs to the superior races, it is the primary and most powerful vehicle of art and poetry. The mythology of the Veda is all symbolic, like that of the Greeks, and it is clearer, broader and nearer nature. The white, the man of the superior race, is an observer and systematic, more than any other. The observation of natural phenomena, a classification of these phenomena, soon lead to giving form and personality to these phenomena, and to assigning a rank or a function to those peculiarities. From all that is an order of symbolism t that forms a religion, from the moment that the metaphysical ideas coordinate and dominate that entirety. For the multitude symbolism suffices, it is the entire religion; for enlightened minds, symbolism is merely an expression of the forces of

nature. For us, descendants of those races of India, it is s still today very difficult to conceive a religion entirely without symbolism; it is then not surprising that at the origin of Christianity symbolism was everywhere. It was necessary to find a transition from pantheism to monotheism; the transition was so long, that it was definitely established among the Greeks and the Latins. In fact the Semite alone is qualified to conceive monotheism; so he has neither art, poetry, m method, nor philosophy. The phenomena of nature do not inspire him, he sees therein only the effect of an immutable law of one God, and their causes excite in him neither curiosity nor a need of knowledge. On the contrary, to the Aryan all in nature lives, acts, contends and is renewed, and death is only a change of form and of material; for him all is a subject of meditation. He wishes to classify, to remember, to understand the result of his observation; for this he composes a mythology, and that becomes so powerful, that he can scarcely part with it, when he rallies to the monotheism of the Semite.

Thus Christianity at its appearance in the old pantheistic world of the Greeks and Romans is compelled to manage carefully that innate sentiment among peoples of Aryan race. It conconceals a metaphysical idea under the mythological symbol, to cause Christianity to penetrate into the minds of the multitude.

The paintings of the catacombs of Rome still retain traces of those compromises between ancient mythology and Christianity. Orpheus attracting wild animals by the sound of his lyre (Fig. 1) symbolizes Christ, whose words unite men under the same law of charity. [1]

Note 1.p.429. Roma sotterrana. Bosio. p. 239; Catacombes de Rome. Perret.

Later is a new symbolical figure, the shepherd bearing the strayed sheep on his shoulders; but this is still a mode of personifying Christ, a personification of Jesus borrowed from one of his parables.

The need of analysis, classification and method, in brief, leads the Aryan race to divide the superior power, and to admit antagonism within the divine order. On the other hand, t the logical mind of the Aryan, his fine practical sense, lead him to conceive the unity, the single motor. To satisfy the t

two sentiments born in him, but which only develop successively, the Aryan symbolizes all the divisions of the superior power, which thus become attributes of a single divine order established later. This explains the difficulties that Christianity must conquer to impose the dogma of the unity of God on races pantheistic by the nature itself of their minds. The difficulties were such, that they were often turned to cause the new religion to be accepted, whether in Greek and Roman civilizations or among barbarians, who were of the same famely as the Greeks, Italiams and Gauls, had the same tendency to pantheism. Hence a prodigious quantity of symbols at the origin of Christianity and during the middle ages. Also long after the official recognition of the Christian faith in the Roman empire, traditions of paganism itself mingled with the new doctrines; and among those traditions, the sacred ceremonies whose object was the fire among all Aryan peoples that could never be effaced. Men no longer rendered homage directly to fire, [1] but fire became symbolical, and enters into Christian worship.

Note 1.p.500. It is necessary to state that among the Aryans and the Hindoos, fire was only regarded as a homage rendered to the supernatural powers, in brief as a sacrifice. But the flame consuming the liquid of the soma was the actual acceptance of the sacrifice by the god, whose presence on the altar was then real. (Essai sur le Vede, by Emile Burnouf. 1863).

The avidity for symbols was such among the Christians in the lack of pantheism, that the Old Testament was no more than a succession of symbols of the New Testament. The antagonism of the divine powers accepted by the Aryans of the Indus and by all the branches of that great human family, was subject to orthodoxy, but no less persisted. The spirit of evil, immortal, powerful, independent and possessing an empire, again finds itself among the Christians and is personified. This desire for symbols gives to the arts and to poetry a vast field to extend over. Thus one can say that our religious edifices of the middle ages are an accumulation of symbols clothed in Christian form, but whose origin very frequently belongs to the ancient pantheism, either to that of the Greeks and Latins, that we know, or to the local pantheism of the Gaulish people, on which we have only limited information, and in the midst of

the traditions borrowed from Christianity itself, the subjects preferred by the image-makers are those with a symbolical character. The prophecies of the Old Testament, the parables of t the evangelists, the apocalypse of S. John' among the legends, those touching symbolism supply painting and statuary with the greatest number of subjects. Thus for example, on the facades of a very great number of churches of Poitou and of Saintonge dating from the 12 th century, on Notre Dame of Poitiers, S. Nicolas of Civray, S. Hilaire of Melle, the cathedral of Angouleme, the church of Surgeres, appears an equestrian statue of great dimensions. The rider is armed; he wears the crown and holds a naked sword in his hand. Under the feet of the horse is habitually represented a little figure of a man on the ground, seeming to ask mercy. Several opinions have been expressed concerning the title of that rider. Men long desired to see Constantine, Pepin or Charlemagne in the representation, occupying an honorable place. Other opinions are more plausible and have replaced this; M. De Cherge sees in those statues the lay founders of the churches. M. Didron claims that they represent S. Martin as the chief of confessors in Gaul. However judicious criticism cannot cause those opinions to be accepted. [1] MM. Jourdain and Duval propose to see in these equestrian statues, either one of the mystical riders of the apocalypse, or which seems better based, the angel sent by God to confound Heliodorus, the profaner of the temple. In fact the text of the book of Maccabees states:- (Latin text).

Note 1.p.501. On this subject, see Notes d'un voyage archaeologique dans le sud-ouest de la France, by M J. Marion. Vol. III. 2 nd series of the collection of the Ecole des chartes. p. 190 et seq.

Note 2.p.501. Maccabees. Book II. Chaps. 3 to 25.

This representation of a historical or legendary fact on the facade of a church is the symbol of the punishments reserved for vialators of the sanctuary. At that epoch most churches had the right of arylum, and contained treasures that might tempt the avarice of the lay nobles. It seemed useful to remind them of the mission of the celestial warrior sent against Heliodorus, the despoiler of the temple of Jerusalem.

One can fully establish that at the end of the 12 th century occurred a revival of symbolism. That is explained:- the reli-

religious orders were especially occupied in the edifices erected by them in showing to believers the merits attached to the monastic life. These are the legends of S. Benedict, S. Madeleine and S. Antoine, then the representations of virtues and vices, the advantages of charity, the struggles against t the temptations of the demon, which furnished the principal subjects of the image-makers. But when the image-makers are laymen, when were erected the great cathedrals, the sacred asylums of the cities, under the inspiration of the episcopate, the metaphysical adie appears and the symbolical subjects show as a multitude. On the one hand, this was a means of protesting against the feudal regime; on the other being a new life restored to old local traditions remaining in the hearts of the people, but diverted by the monastic spirit, and particularly by the Cistercians.

Then appeared the representations of the last days of the world, the divine justice being symbolized by the scales of a balance, on which rests the spirit of the shades; the damned are taken from all ranks of society, from kings and popes to Villeins. Christ during the judgment is seated on the throne, showing his wounds, no longer has the apostles, but near him is his mother, a symbol of mercy for mortals; angels hold the instruments of the passion, symbols of the redemption and a visible reproach to men, who have not followed the way opened by the death of the Son of God. Around the scene the presence of lawgivers, patriarchs, prophets and martyrs, symbolizes the merits and the labors that elevate man to celestial blessedness.

The apostles no longer accompany Christ in his glory, but the Christ, and below that assembly are symbolized the passions that lead man to evil, the virtues that render him worthy of approaching the Deity, that are found reproduced on the portals of Notre Dame of Paris, Chartres and Amiens, may be regarded as the most beautiful conceptions of Christian symbolism applied to works, by the aid of which man elevates his intelligence and succeeds in detaching it from terrestrial bonds. And in fact in the imagery of our cathedrals, one no longer sees as in the sculptures of monastic churches the first place given to the legends of the holy founders of the religious orders, to persons having lived in austerity and monastic contemplation. Labor, military life and struggle, are glorified

everywhere. The personages that in the diocese have devoted their lives to aid and instruction, take the first rank. This homage rendered to active and laborious life is a fact meriting attention, because it develops with remarkable energy at the beginning of the 13 th century, under the influence of the lay schools of artists in the North. In fact, the symbolism of one great French cathedral possesses its own character; the monuments demonstrate it in the most evident manner, but also in a very curious book, finished in 1284, the Rational of the divine offices by William Durand, bishop of Mende. This prelate lived but a few years in Paris to devote himself to studies of canon and civil law; this was about 1255. The rest of his life passed in Italy and in the South of France, where he occupied the throne of Mende. Now William Durand, who commences his work by writing on the church and its parts, speaks of foundations, walls, piers, vaults, roofs, windows, orientation, towers, doorways, etc. To all these parts of the monument he attaches a symbolical sense; but when he treats of sculptures and paintings, he is brief, gives vague interpretations, and seems to have in view the works of the Byzantine Greeks. Then about the end of the 13 th century in Italy and in the southern provinces of France the images were still Byzantine, or under the influence of Gallo-Roman traditions, and the grand conceptions in sculpture of the schools of Isle-de-France, Picardy, Burgundy and Champagne had scarcely penetrated beyond the Loire. Men began to erect the cathedrals of Limoges, Clermont and Narbonne, in imitation (in architecture) of the churches of Amiens and Beauvais, but either the absence of statuary made itself felt, or the sculpture of the ornament itself is of a dryness and sterility of invention uncommon in that epoch. The images and symbolism of our monuments in the North are then actually local, and to pretend to derive these schools from the Italians, Lombards or others, is to commit a singular anachronism.

Note 1.p.503. Articles Sculpture, Statuaire.

From the point of view of the practice of art, our lay schools of the North could not be inspired by the Lombard schools, since they succeeded the latter by nearly a century in perfection of execution; they are even but slightly based on our Roman art, as emphasized, we believe by our Art. Statuaire. As

for the symbolism of the schools, it indeed belongs peculiarly to them. The silence of William Durand, more Italian than French, proves that at the end of the 13 th century that symbolism was ignored in Italy, and that men still adhered to that of the Byzantines, without knowing much of it, since the bishop of mende claims tha the Greeks for conventional reasons painted the figures of saints or divine personages only from the head to the navel, i.e., as a bust. In reading Chap. III of the Rational, one easily recognizes that William Durand s showed the hesitation of many Italian prelates at that epoch, concerning the expediency of propriety of images in churches, especially if sculptured. He extends to considerable length on the passages of the old law and the decrees of councils, where images are forbidden in the sacred places; he further recognizes that painting affects the mind more than writing. Thus he is disposed to admit it; but his vague manner of speaking and the almost absolute silence that he preserves concerning sculpture, sufficiently show that he did not form a clear idea of the grand poems in stone, that cover our religious monuments of the North.

The success of the animal books during the 12 th and 13 th centuries is explained by this love of symbolism then possessed by all minds. Those animals, real or fanciful, to which these treatises attributed such singular qualities, and which are only symbols of the divine virtues or of the evil inspirations of the demon, are represented in great numbers on our monuments. Among the people, many of these animals lived in the imagination before Christianity. The legends attached to them or the natures attributed to them, dated from afar and had already been Christianized by the Fathers. Pagan symbols, the beasts were often changed into Christian symbols. One c could cite a certain number of these animals, who certainly had their pagan symbolical signification. Pantheism, that observed nature with such perspicacity, and that established i its religious system on that observation, could not fail to cake a symbol of the animal in many cases; without counting t that in antiquity, the symbolism attached to the animal went so far as to render it sacred, for example like the ox among the Egyptians. During the most elevated period of the middle ages, all men versed in the study of the mysteries of religion

gave to the sacred writings four different meanings; according to these, they could be interpreted in the historical allegorical, tropological and anagogical senses. [1] According to thi s principle, every man by meditation can from material facts ar arrive at moral instruction, from which he deduces (regarding the things of this world as moved by a divine will), that each fact is only produced for a moral end, and is the visible symbol on an intellectual phenomenon, a divine intervention, a moral power. From the moment that according to the Fathers o one admitted that historical facts, such as those contained in the Old Testament, or for example the Song of Songs, were produced only as a prophecy of the coming of Christ and of the establishment of his Church: that the sacred scriptures announced or signified under a historical veil, both the events of the life of Jesus, his death, resurrection, the redemption and all the events of the first Christian communion, there were so many motives to admit, that everything created was only to announce or signify those great events. There were no more efforts for the minds of believers to find in the Song of Songs a prophetic and spiritual representation of the Church, than to see in the owl [2] a symbol of Christ. Does not one read in the sacred scriptures:- "I am made like an owl in the dwelling."? [3] Among the Athenians the owl was the symbol of discretion, the bird of Athene. The Christian animal books are only copies of the fables contained in the natural history of Aelian and of Pliny, with a symbolical sense converted to the new religion, [4] but whose origin is found in the highest antiquity. It is the same with the demons, or the power assumed by the demon in the symbolism of the middle ages. V. A. Maury says, with that knowledge that one recognizes; [5] "The characters given by the Fathers of the Church to the demons are in fact the s same, as those found in the Platonists; those writers search the books of the Greeks, borrow their words, arm themselves with their authority, share all their superstitions, and it i only by referring to Plato, that they declare the universe to be delivered to the worship of demons, to evil and perverse beings that fill the atmosphere, ente into the human body, speak by the oracles, suggest evil thoughts and culpable actions, and finally dwell in the idols, that the common people take to be the image of the Deity, and feed with the blood of

victims and the smoke of sacrifices. While they reserve to t the devils," adds M. Maury, "confounded with the demons, all the characters of the demons of neoplatonism, the Christians apply to the angels what the philosophers had reported concerning the beneficent part of demons. They make of the genii p psychopompes, who preside over the distribution and formation of souls. The heritage of Plato thus passes to the Christians, who demand from his ideas all that could illustrate or complete their doctrine; they make of his demonology an arm to overthrow the polytheism, whose basis they have already shaken; once the gods are reduced to be no more than evil genii, the name of Jesus suffices to conjure them all and send them to hell." It must be added that in making the gods or divine emanations accepted by polytheism either demons or angels, i.e., agents of evil and protectors of men; in considering the organic and even inorganic nature as a symbolism, either of divine qualities or of human passions, Christianity yielded to this tendency of the white races to polytheism; this was in the new religion the introduction of the ancient polytheism of the forces of nature, adopted by the Aryans, the source of all po poetry and of all art. Now this symbolism of the struggle between good and evil is traced with remarkable power in our religious edifices of the beginning of the 13 th century; each subject has its opposite; the representation of virtue leads to the representation of evil. Beneath the sacred personages are figured the malevolent beings that they must have dominated by the purity of their lives, their faith or their labors. The bishop always sets the staff of his cross in the mouth of a dragon, that writhes beneath his feet. Beneath the Virgin is represented the serpent tempter and the fall of Adam; under Christ are the lion and the dragon. Beside subjects from the New Testament are placed characters taken from the Old T Testament, regarded as the symbolical announcement of the coming of Christ and the events of his life. This antithesis in sculpture, that is found in painting as well as in sculpture, gives life and movement to this art of the middle ages, so l little understood today.

Note 1.p.504. William Durand, Rationale div. Off. Proem. p.2.

Note 2.p.504. The nyctorax (owl) of the Latin animal books, the nicorace of the animal book of Guillaume, the Norman troubadour.

Note 3.p.504. Psalm 101.

Note 4.p.504. Melanges Archaeol. of R. P. Martin & Cahier. Vol. II, p. 106; also Bestiare divin of Guillaume, cleric of Normandy, published by M. C. Hippeau (Caen, 1852); the work of the celebrated Hugues de S. Victor, Institutiones monasticae, concerning beasts and other things. Hugues de S. Victor explains the reasons why, according to him, those representations must be adopted in the churches; Latin text). Vol. II. p. 394

Note 5.p.504. Histoire des religions. Vol. III. p. 429.

It is not alone in the religious monuments that symbolism is developed. There were from the 13 th century the "bestiaries" (animal books) of love as well as the divine "bestiaries." One of those bestiaries of love remains to us. Written about the end of the 13 th century by Richard de Fournival, chancellor of the church of Notre Dame of Amiens, he gives our legendary zoology a secular symbolism. This bestiare of love is f found figured in a great number of sculptures belonging to h habitations, castles, houses and mansions of the 14 th and 15 th centuries.[1] These animals found sculptured on our edifices, either sacred or secular, are then not the products of caprice or fancy, as so frequently repeated; they have a signification, are intended to be impressed in the memory by the aid of a symbolism then accepted by all the world, of virtues, of qualities good to acquire, vices or errors as necessary to a avoid. The common people, who could not read, thus found by means of an oral explanation, an instruction constantly placed before their eyes. This is very well explained by Richard de Fournival himself at the beginning of his bestiary of love. "When one sees a story of Troy or any other, one sees the faces of the men behind as if they were present; and thus with speech; for when I read a romance men understand as if they were there. And therefore one presents what is wrong, by these two things can one remember. For I send you this written by painting and speech, so that when I am not there, this written by painting and by words will restore me to your memory as if present."

Note 1.p.506. Notice sur la vie et les ouvrages de Richard de Fournival, inserted in Vol. II of the second series of the collection of the Ecole des chartes, p. 82, by M. P. Paris; of the Bestiare d'amour by Richard de Fournivel, followed by a reply

a reply of a lady, after the manuscript of the imperial library. (Hippeau. 1860. A. Aubry. edit.).

The fables so frequently reproduced in our sculptures and paintings of the 13 th, 14 th and 15 th centuries, are mostly a moral instruction entended to impress itself in the memory by the eyes. But these representations cannot be confounded with the symbolical figures, that are of a higher order, and require a certain amount of metaphysics to be understood. It is unnecessary to emphasize what resources the symbolism of the middle ages offered to artists, and everything considered, how much more poetical it could be than those common representations of ornaments and of figures without meaning to the m multitude, with which we cover our monuments since the Renaissance. Thus it is not surprising, that the indifference to a all these sculptures, even allegorical, has replaced among the people the interest attached to the symbols, whose sense is discovered by everyone. Thus among us art is only addressed to dilettanteeism, and has ceased to penetrate into the life of all, from small to great; and that under the reign of a conventional classicism, besides amateurs, there are now found only barbarians.

The middle ages did not regularly adopt the symbolism of colors, like the Byzantines in their paintings. Some personages are represented with vestments habitually colored in the same manner, but one cannot find there the trace of a system uniformly adopted. Red and blue or purple and blue are generally used for the vestments of Christ and of the Virgin after the 13 th century, but even to that rule one finds numerous exceptions. Yet in the liturgy as adopted both for the veils, the altar fronts, and the priestly vestments, are certain symbolical colors whose meaning is furnished by oriental antiquity. The artist image-makers do not seem to have been obliged to observe rules in the representations required from them. It is n not the same for painted or gilded ornaments that enrich the vestments of statues. These ornaments almost always have a s symbolical sense. Thus on the mantle or robe of the Virgin a are seen figured the lion of Judah, the fleur-de-lis; on the vestments of Christ is the cros ; on the robe of S. John the evangelist are eaglets. Coats of arms themselves may be regarded as symbolical figures, and the importance that they assumed

since the 13 th century indicates how much the taste for symbolism had permeated the society of the middle ages.

SYMETRIE. Symmetry.

A Greek word Frenchified, whose signification has been slightly changed since the 16 th century. Symmetry,or rather symmetria, to adopt the orthography of the authors of the 15 th and 16 th centuries, which was good, signifies; proper relations between measures, harmony, balance, moderate relations, calculated in view of a result satisfactory to the mind and to the eyes. The word symmetry having been applied to architecture, it is not explained why the word eurythmia, which means "good or beautiful rhythm," was not also employed, for it is much better than the Latin "proportio" or rather "proportions," that is vague and does not have the meaning in relation to the art of architecture. We do not here have to discuss the value of words. Yet at the origin these expressed a definite order of ideas; this orde has been profoundly modified, and it is useful to render an exact account of the idea attached to the primitive word symmetry to recognize the different sense assigned to it today. If the idea be no longer in relation to the word, it follows that either the idea is false, or that the word is improper. Today in the language of architects symmetry signifies, not a balance, a harmonious relation of the parts to the entirety, but a similarity of opposite parts, the exact reproduction at the left of an axis, and what is at the right. Itis necessary to render this justice to the Greeks, the authors of the word symmetry, that they never assigned to it so flat a sense. Here is the definition of Vitruvius:- [1] "As for symmetry, it is a proper harmony of the members, of works to each other, and of separate parts, the ratio of each part to the entirety, as in the human body, where exists a harmony between the arm (elbow), foot, palm, finger and the other parts of the body. It is thus in perfect works, and in the first place in sacred edifices(from which the harmony is deduced) of the diameter of columns or of the triglyph. Likewise the hole that the Greeks call "peitreton" makes known the dimension of the ballista (to which it belonged); [1] also similarly, the interval between two pins (of oars) of a ship, a space termed "dipecaike" (permits one to know the

dimensions of that ship). Thus is it in all works whose symmetrical system is given by numbers."

Note 1.p.507. (Latin quotation from Vitruvius. Book I. Chap.2).

Note 1.p.508. Just as now the calibre of a cannon permits a one to know its dimensions.

It is clear that Vitruvius here gives to the word symmetry the Greek sense, [2] which is not that which we assign to it. Thus Perrault, who did not understand that Vitruvius omitted to occupy himself with symmetry as understood in his time, tr translated "symmetria" by "proportion,", and made a note to explain how proportion and symmetry are distinct properties, and that Vitruvius omitted to treat of the second. Thus according to Perrault, Vitruvius erred in employing here the word symmetry, and the French translator inferred from the Latin author, writing according to Greek methods, what symmetry is. To express what we understand by symmet y (an inverted tracing, a counterpart), there was no need to make a word. This is an operation so ordinary and insignificant, that the Greeks had not even the idea of defining it. For them, symmetry is an entirely different matter. It is a harmony of measures, and not a similarity or a repetition of parts. But Vitruvius speaks o only of symmetry, but also defines eurhythmy as a property n necessary to the art of architecture:- "Eurhythmy," says he, "is the pleasing appearance, the happy aspect of the different members in the entirety of the composition; which is obtained by establishing proper ratios between height and width, width and length, so that the mass responds to a principle of symmetry." [3] Eurythmy signifying beautiful or proper rhythm; symmetry, ratios and measures, and eurythmy being an essential p part of symmetry, it followed for the Greeks that symmetry w was a ratio of measures adopted and established according to a rhythm adopted. Likewise in poetry and music are rhythm and measure. Prose may have rhythm without being metrical; verse may have metrical without having rhythm; but poetry and music possess both rhythm and measure. The Greeks, who had made such a complete study of the appearance of the human body, regarded it as especially possessing these two qualities blended in m harmonic unity, eurythmy and symmetry. That is why Vitruvius gives as a type of the symmetrical system the human body, all whose parts are in a perfect harmonic relation, for as men, a

and form an entirety in which nothing needs changing.

Note 2.p.508. This sense is perfectly illustrated by the last works of M. Aures on the Parthenon, the column of Trajan, and by his Theorie du module (Nimes. 1862). We are pleased to recognize that M. Aures has recovered the symmetrical system of Greek architecture, and that no doubt of this discovery can remain in the minds of persons familiar with these matters. We appreciate his theory better, that cannot be discussed, s since he bases is on mathematical elements, and that we have long sought the key to this problem, and that like many others, we have accused Vitruvius of not possessing. Now on the contrary, M. Aures proves that the te t of Vitruvius accords in all points with the ratios of measures (symmetry) of antique monuments. (See Theorie du module, etc. 1862).

Note 3.p.508. (Latin note).

The Greeks accord the property of symmetry especially to the body of a man, not because its two longitudinal halves are similar, but because the different parts composing it are in excellent ratios of dimensions, according to their functions and position. Besides, is it not evident that this similarity of the two longitudinal halves of the human body is never important, and cannot cons-itute the property of symmetry for the Greek, since the least movement destroys that similarity, and that it does not exist in profile. This is the eurythmy, i.e., a happy combination of different times, and a judicious ratio of dimensions that constitute his symmetry, and not the parallelism of the two halves, a parallelism never produced to the eyes, and consequently would not be a structural property, that could interest the artist.

It is certain that the Greeks did not consider what we today understand by symmetry as an essential element of art in architecture, and that if they have accepted the similarity of parts or the counterpart, to use a common expression, they did not raise that condition to the height of a fundamental law. The nature of man by instinct even leads him to double n his conceptions, to seek balance by the aid of parallelism, but that mechanical operation, into which intelligence does not enter, has no relation to art.

To place an edifice in rhythm for the Greek, was to find an alternation of voids and solids, that should be for the eye,

for example, what is for the ear the alternation of two short and a long note; to subject it to the law of symmetry was to make numerical ratios satisfactory to the eye between the diameter of a column, its height and the intercolumniation, the c capitals and other members, not by experiments but by the aid of a formula. [1]

Note 1.p.509. On this subject, we believe it necessary here to cite a note of M. Aures, unpublished in part, and which we owe to his extreme courtesy. "It seems to me incontestable, t that the temples of Paestum, as well as that of Metoponte and even those of Agrigente, were constructed by artists that employed the Italian foot divided into 1" ins., to the complete exclusion of the Greek foot and its division into 16 dactyls. And also that is only the least of the results that I have obtained, for the choice of numbers and the use of a module taken at the middle of the diameter of the columns, are all singularly remarkable at Paestum."

"Here in particular is a detail relating to the capitals of the great temple. If one considers them as divided horizontally into two distinct parts, the upper one comprising the abacus and echinus, the lower one including the annulets, the prolongation of the shaft and the hollow of the gorge, the following relations are found between the dimensions of the capitals of the three orders."

	Little upper order.	Mean lower order.	Great external order.
Lower part	9°	11°	15°
Upper part.	16°	25°	36°
Total height.	25°	36°	51°

"Thus the total height of the little capital (25°) is equal to the upper part of the mean capital, as the total height of the last capital (36°) equals the height of the upper part of the great capital."

"This last height of 36° is equal to 3.0 ft., and is further the module that served to determine the dimensions of the temple; it is the width of a triglyph. Now note the number 3. Not only is it odd and prime, but it is particularly the sacred number. Also observe the numbers 16, 25, 36, that express the heights of the upper parts of the three capitals; the first is the square of 4; the second the square of 5; the third is the square of 6."

"For the squares of numbers are formed powers, as Censorin

taught us in his treatise, de die natali, chap. 14 (edition of Venice, 1581. This quotation is found in chap. 4)."

"Is it necessary to add that these square numbers themselves retain today the name of powers, since mathematicians say in the usual language: second or third power of a number to express the square or cube?"

"But let us devote our attention especially to the numbers 9, 16, 25, which correspond to the three heights of the little capital. These are the squares of the numbers 3, 4, 5, which serve to form the symbolical triangle (Egyptian), that p played such a great part in antiquity. This triangle further serves to determine the inclination of the echinus of the capitals of the Parthenon (internal order); only in this last example the triangle is reversed; the vertical side equals 4 and the horizontal side equals 3."

"If the height of the lower part of the capital of the great order (at Paestum) had been equal to 13° instead of 15°, the total height of this capital would have equaled 49, i.e., to the square of 7. I have explained in a memoir on that edifice why the number 15 was preferred to the number 13."

"However this last point may be, it is a fact that at Paestum all the numbers employed are odd or square. This is a general law. "For to observe odd numbers is a custom," says Vegetius in his treatise, De re militare. Book III. Chap. 8."

If one measures the Parthenon with the aid of the Greek foot and not with the metre, he will recognize that there exist b between all these measures numerical ratios, that cannot be t the product of chance: that the idea of harmony dominates the idea of symmetry, according to the acceptance of that word t today. In fact, the intercolumniations are not equal, the dimensions of the columns differ, the axes of the columns of t the peristyle do not correspond to those of the front columns. These differences of measures are the result of combinations of numbers. That the law was made only after numerous experiments, we admit, but it is no less certain that the Greek architects desired to translate into law the results of their researches. Besides, as demonstrated in the preceding Note, long before the construction of the Parthenon, numerical ratios a and symmetry existed in architecture. We again find this symmetrical principle, i.e., numerical ratios in Egyptian archi-

architecture; while the Egyptians no more than the Greeks seem to have occupied themselves much with symmetry, as we accept it today. The houses of Pompeii have no pretense to symmetry as we understand it, although in their different parts are f found those numerical ratios, that form the antique symmetry.

That men strongly adhered to the symmetry introduced in the 16 th and especially in the 17 th century in Italy and France, is an intellectual inferiority that we verify; but that one pretends to derive this taste for counterparts from beautiful antiquity, cannot be sustained. That may be in the classical principles of our schools, but not in antique principles, and it must be said, that it does very little honor to Greek artists, to believe that they had erected as a principle the theory of counterparts, which is only a sort of human instinct to be taken into account, but without giving it the value of a question concerning art.

The architects of the middle ages are neither more no less subject to this ordinary instinct than Greek artists. They did not disdain it, but they have first taken up the suitability, needs and harmonic principles analogous to those of the Greeks. When the masters of the middle ages erected a monument whose purpose comprised two similar parts, in brief, counterparts, they have not affected dissimilarity. The plans of their churches and of their great halls are symmetrical, according to the modern signification of the word. [1] But the plans of their castles and palaces present irregularities in the entirety, that one finds no less prominent in the villas and houses of the ancients. Even the plan of the Palatine itself, conceived under the empire and in an epoch when a sort of majesty was found in counterparts, never had a plan, symmetrical from the modern point of view.

Note 1.p.511. In these plans it is necessary to take into o account the modifications or additions made later, and which destroyed the similarities. This is not always done by persons that assume the architects of the middle ages to have sought irregularity. Thus we frequently have heard critics place to the account of the primary conception the additions or changes made several centuries later.

In Art. Proportion, we have emphasized certain geometrical formulas, by the aid of which the masters of the middle ages

obtained harmonic ratios in their monuments. It is very evident that they had other methods, they likewise used numbers, and employed a symmetrical method analogous to that adopted by the Greeks although the two architectural styles essentially differed in their principles. We have proved elsewhere that the Greeks, like the Egyptians, also employed the geometrical method, for the two methods derived from numbers and geometry lend themselves to a natural concurrence.

To make appreciated the symmetrical and eurythmical methods of the masters of the middle ages, it is necessary to take a typical monument, that has not suffered sensible alterations. We cannot do better than to resort to the abbey church of S. Yved of Braisne, one of the best conceived monuments of Soissonais, certainly built under the direction of an artist consummate in his art. [1] This monument was commenced in 1180 but only consecrated in 1216; thus it belongs to that first and brilliant series of the lay schools. The legend that gives t the history of its construction is itself impressed by that tradition of sacred numbers, that on frequently finds in the antique legends relating to architectural works. It is Matthieu Herbelin that speaks;- [2] "At the time that the notable l lady Agnes, countess of Dreux and of Braisne, caused the building and erection of the work of the said church, there were 12 master masons, who had the care and oversight of all other workmen, both cutting the images and the sumptuous works of the said church, as well as to conduct the work. And how the said work was done and directed daily, there were continually and daily 13 masters, yet at night in paying and fixing the wages of the said workmen, there were only the said 12 masters. By which one could believe and esteem that this was a miraculous work, and that our Lord God made up the said number of 13. All the said work, as one can presently see, was done and completed in 7 years and 7 days, as one finds by the old chronicle of the foundation of the said church."

Note 1.p.512. The front part (nave) of this church was demolished a few years since; but the plane remain, as well as one bay of this nave, that consequently gives its section.

Note 2.p.512. Manuscript belonging to M. Petit de Champlain at Braisne. -- See the Monographie de S. Yved de Braisne, by M. S. Prioux.

We cannot certify that this monument was constructed in 7 years and 7 days; but we can verify that the number 7 is the generator of the plan, and that this plan is further traced according to the system of construction adopted, i.e., that the vaults entirely control the design. This was to act according to the logical method, that subjects the entire tracing of the plan to the construction of the vaults, from the instant that this mode was adopted.

What constitutes the so-called Gothic vault is the cross v vault, the diagonal arch and not the transverse arch. [1] The diagonal arch establishes the novelty of the system, which originated and developed in the 12 th century (whatever is stated, and till the contrary is proved), in the provinces of the North of France. [2] The diagonal arch in a vaulted edifice, c conceived by a skilful master, became the generator of the system of construction, and consequently of all symmetry, as with the Greeks the column is the starting point of the entire symmetry of the monument. The two arts are equally subject to an inflexible logic, starting from two different points, but reasoning in the same manner. In the Grecian structure, the point of vertical support is the principle; in our lay architecture of the middle ages the principle is the vault; it imposes the points of support, their strength and their sections. The Greek well knew that he would have to support only loads acting vertically and starts from the ground; he arranges his points of support according to the necessary order of symmetry. [3] He does not have to occupy himself with soffits, lintels or ceilings, that he is always certain to be able to combine on those points of support, much stronger and nearer together, than are rigorously necessary. His ordonnance are the walls, columns a and their entablatures. Properly speaking, these constitute the edifice for him. There it is necessary to submit to the laws of symmetry and of eurythmy. This structure being placed according to a harmonic method, the monument is made and its arrangement found.

Note 1.p.513. Articles Construction, Ogive, Voute.

Note 2.p.513. This opinion has been strongly opposed; it is still held by some deloyed writers, that occupy themselves w with the history of architecture; but it must be stated that it is not contested as it should be, by proofs derived from

the practical knowledge of our art. A single sketch showing us a cross vault with diagonal arches constructed according to the French vault, but traced with the system of jointing used elsewhere than in France and preceding 1140, would be more c convincing than all the phrases written against our opinion.

Note 3.p.513. It is understood that we employ the word symmetry with the antique meaning, which is also that of the middle ages; for if they did not have the word, they had the method.

For the master of the middle ages the thing supported was the principal object, this vault was required to be supported and abutted. Consequently the vault dominates the symmetry of all parts. The architect no longer conceives his plan at the base, but by the object that determines the position and strength of that base. The vault therefore gives the trace of the plan, a and the symmetry of that drawing produces thus diagonal arches, whose function was then new, but will assume capital importance.

Few edifices indicate better than the church of S. Yved of Braisne the symmetrical system employed by these masters of the end of the 12 th century.

Two diagonals a b, c d, are drawn to intersect at right angles (diagonals of a square. Fig. 1). On these two diagonals, from the point of intersection o are laid off 3 fathoms, 3 ft. and 6 ins. Then are measured 7 fathoms 1 ft. from e to f and from g to h. On the prolongations g i, f y, etc., 4 toises are laid off; then one measures 15 toises 1 ft. from t to m and from l to y. Joining the points l i, i y, y m, m l, and the points e g, g f, f h and f e, by lines, one obtains two squares whose sides prolonged give intersections p q, etc. From these points p q drawing diagonal lines parallel to c d, and from the point i a parallel to a b, one obtains the points r s. From each side of the point i, laying off 1.5 ft. on the line r s, and taking r s as centres, the semicircular chapels are traced. The intersection of this circle with the line r s prolonged gives the line t u, the axis of the transverse arch at the entrance of the apsidal chapel. The surfaces of the internal walls of this are placed 7 ins. inside the axis of the transverse arch V X. The distance between the two axes of the transverse arches u and W is 17 ft. To trace the semicircle, the distance between the walls of the chapel is taken as the diameter of a semicircle A. This semicircle was divided in 5

parts, and from the division a a drawing a line through the centre of the semicircle was obtained the point b b, which gives the space bb, cc, between the axis of the transverse arch W and the crown of the vault of the chapel. Then this was traced with 7 bays pierced by equal windows. At the level of these windows, the walls of the chapels are 3 ft. thick, the buttresses B are 3 ft. wide with the same projection. The surfaces of the walls of the transept at D and G have been brought 7 ins. inside the lines of the layout. To free the windows of the last bay of the side aisle of the nave, because of the thickness of the wall of the transept, the axis of the last transverse arch H has been set 14 ins. (twice 7) from the point K. The rest of the nave is traced by the diagonals y z; the intersection z with the line g f prolonged gives the axes of the columns, that are 2 ft. 4.5 ins. in diameter. The span of the nave between axes of the columns is 30 ft. 7 ins.

One will note that in all these dimensions the figures 7, 4 and 3 dominate, all three being reputed sacred in antiquity and in the middle ages. The generating measure of the entire plan is 7 fathoms 1 ft., and 4 fathoms. The detail measures consist of the numbers 3 and 7. The spacing between axes of the columns of the nave lengthwise is 16 ft., the square of 4. [1]

.Note 1.p.514. On our Fig. 1, we have traced the plan of the facade, of which there remain only substructures and old plans. The nave consists of 6 bays, including the bay T.

We have rendered an account of the causes that produce happy proportions, and favorable combinations of lines in architecture.

Now we have stated elsewhere, [1] that one cannot obtain symmetrical combinations, i.e., presenting a proper accord with similar measures or divisors od those measures. Nothing is more disagreeable to the eyes than a monument whose parts present similar divisions of solids and voids, or spaces either horizontal or vertical, for example, such as 4, 2, 4, 2, or even 6, 2, 3, 2, 6. The Greeks, and after them the masters of the middle ages, were then perfectly right in adopting what they regarded as sacred numbers, 3, 4, 7, which were not divisible by each other, and whose squares 9, 16, 49, were also indivisible by each other. It is very singular that the artists of the Renaissance and of the 16 th century, who pretended to

return to antiquity, neglected such important laws in the architecture of the ancients, and that were known by the masters of the middle ages.

Note 1.p.516. See Article Proportion.

But let us take one of the great piers of the transverse a aisle of S. Yved of Braisne. (Fig. 2, at A). We shall find in that detail the observance of these laws as well as in the entirety. On the drawing are marked the measures in ft., ins. and lines (12 to the inch). A square a b c d with side of 3 ft., is the generator of this pier. Adding twice 7 ins. to this square, one obtains the projections e, f. The diameter of the large columns is 1 ft. 3 ins. 6 lines. The angle columns supporting the diagonac arches are 8 ins., 2 × 4, and the little reinforcing columns are 6 lines, 2 × 3; the total thickness of the pier is 7 ft., 10 ins., 6 lines. At B is drawn the pier at the entrance of the semicircular chapels, and at C is one of the columns with the sketch of the transverse arch and the little columns bearing the ribs of the high vaults. The diagonal arches D are 21 ft. All these dimensions are composed by unity and the numbers 3, 4 and 7, or 10, 6, 8, 14. An internal bay (Fig. 3), gives us in elevation ratios produced by the same numbers. In the sanctuary, the height of the columns, including the base and capital, is 16 ft., the square of 4. If we deduct the base, of 14 ft. 7 ins.,the great capitals A take 3 ft, 3 × 4. The height of the triforium is 9 ft, 3 × 3. The opening of the high windows is 6. ft. Even in the least details one finds the influence of these numbers, 3, 4, 7: 6, 8, 14; 12, 3 × 4, and 21, 3× 7. (The transverse arches are 27 ins. wide). Then if the masters of the middle ages listened to their fancy, as daily repeated in spite of proofs, to the contrary, it must be recognized, that their fancy or c caprice was versed in the knowledge of ratios of numbers, and of symmetry, as understood by the ancients.

When one has adopted the metrical system (of which we have taken care not to complain), he does not assume for an instant, that he would make inexplicable the entire harmonic system of ancient architecture. Now to measure and understand the Greek monuments, it is necessary to measure them with the Greek foot; to get the procedures of the masters of the middle ages, they must be studied with the royal foot. The division of the fath-

fathom by 6 and of the foo by 12 is very favorable to symmetrical compositions, the number 12 being divisible into halves, quarters and thirds, and the number 7 being to the eye in an appreciable ratio with them. In fact, if we establish divisions on a facade, for example, that give the numbers 3, 1, 4, 6, the trained eye might be shocked by these divisions, whose ratios it could decompose. But if we have 3, 1, 4, 7, the observer cannot establish the ratios between 3 and 7 or 4 and 7, as he can between 3 and 6, 4 and 6. This number 7 that makes trouble in the divisors of 12 or the squares of those divisors, is then a necessary variation to avoid the fatiguing monotony of parts that can be decomposed by each other. Thus it is interesting to see in edifices conceived by skilful artists, how this figure 7, 7 lines, 7 ins. or 7 ft., comes to interpose itself between the ordinary dimensions given by the foot and the fathom, 1 fathom, 3 ft., 1 ft., 6, 3, 8, 4 ins.

Certainly, something else than formulas are required for designing and erecting an edifice subject to beautiful proportions and good symmetry. But one will recognize, however little he may have practised architecture, that it is not useless to have before him certain fixed laws, that in many cases will s spare him experiments and endless uncertainties. When it is necessary to have recourse to instinct, to taste, if you prefer, without other support, one is often much embarrassed. As Assuming that feeling may be sufficiently certain to cause y you to avoid errors, it is always well to be able to give the reason for what feeling indicates. These means, these procedures of symmetry adopted by the ancients and by the artists of the middle ages have another advantage, which is that they permit one to take a free method, to give an immediate form to the conception; and it is to those procedures that the good monuments erected during the middle ages owe their marked appearance, their freedom of method, qualities so rare since the 16 th century, and especially in our days, when vagueness and uncertainty appear on our edifices, and are so badly concealed under a mass of ornaments and details without relation to the whole.

SYNAGOGUE. Synagogue.

A place consecrated to the religious ceremonies of the Jews.

There existed numerous synagogues in France during the first centuries of the middle ages. Philip August in 1180 caused t them to be destroyed or converted into churches. At Paris the Jews possessed a celebrated synagogue on the island; by letters dated the same year, the king permitted the bishop to convert this synagogue into a church, under the name of S. Magdelaine. There remains to us in France none of those edifices of a somewhat early epoch, which is to be regretted, for their arrangement must present interesting peculiarities. It is to be presumed that those monuments were very simple externally, so as to attract as little as possible the attention of the Catholic people.

There exists at Worms a hall of the 12 th century, that is shown as having served as a synagogue. It would be to verify, if indeed this edifice was originally built for that purpose. It is an interior composed of six Roman round cross vaults r resting on two middle columns. This hall internally is 29.5 ft. wide by 44.3 ft. long. The walls are 3.6 ft. thick. Quite high beneath the vaults, it is lighted by pointed arches, with circular eyes over the archivolt. Further, no appearance of a gallery or sanctuary. The doorway is pierced near the angle in one of the longer sides, thus opening into the middle one of the 6 bays.

The vignettes of the 14 th and 15 th centuries, that sometimes represent the interiors of synagogues, give them the appearance of a Catholic church; but the miniaturists of the m middle ages never represent a temple otherwise, whatever the worship to which it was devoted.

End of Eighth Volume.

TABLE OF CONTENTS.

RATIONAL DICTIONARY

of

FRENCH ARCHITECTURE

From XI to XVI Centuries

By

EUGENE EMANUEL VIOLLET-LE-DUC

Government Architect

Inspector General of Diocesan Edifices

Volume IX

From Tabernacle to Zodiaque

PARIS

Translated by N. Clifford Ricker. D. Arch.

Emeritus Professor of Architecture

UNIVERSITY OF ILLINOIS

Urbana. Ill.

1919

TABERNACLE. Tabernacle.

A name given today to a little cupboard placed on the altar at the middle of the reredos, and that serves to deposit the pyx.

The establishment of tabernacles on the altars only dates f from the last (18 th) century. Until the 17 th century the hosts were placed in little shrines placed beside the altar, or in a suspended case. (Art. Autel; also Art. Tabernacle in Dictionnaire du mobilier francais). These little shrines placed near the altar were of wood, stone or metal with a lantern for placing a lamp. Some of those tabernacles dating from the 16 th century are still seen in the churches of Belgium. These reservations of the holy eucharist were often portable, and were only placed near the altar during divine service.

TAILLE. Stonecutting.

Men say:- "A good cutting, careless cutting, laid cutting," to indicate the manner in which is treated a stone surface. The nature of the cutting is one of the most certain means for recognizing the date of a structure; but from the 12 th century the different schools of stonecutters had procedures that belonged to them, and that it is necessary to know to avoid confusion. Thus certein provinces have adopted the toothchisel,[1] or have only employed those tools very late. Some stonecutters use only the narrow or broad chisel; some countries have always employed the cutting axe without teeth and with more or less skill.

Note 1.p.1. A tool with toothed edge.

As many facings of Roman edifices are made in perfection, being under the direction of Greek artists, so many surfaces of our Gallo-Roman monuments under the empire are neglected. Besides the Greeks, like the Romans, set cut stone with clay clay joints and without mortar and roughed, they dressed the face when the work was erected. When they employed hard material like granite or marble, cutting was finished before setting. Many Greek monuments of cut stone have remained roughed. For example, the temple of Segeste and the great temple of S Selinonte of the Doric period, exhibit at many places only a preliminary cutting.

As for Roman edifices of cut stone, there exist very few that are not entirely dressed surfaces. The Coliseum, the gate

Carlovingian epoch, chiseling seems abandoned. Men no longer built with cut stone. On the contrary, we see chiseling employed everywhere in the stonecutting of the 8 th and 9 th centuries, the chiseling being done unskilfully, but still labored. During that epoch mouldings are entirely worked with the chisel. For the simple surfaces are rude, cut with the point and dressed with the wide flat chisel. In Burgundy and Charolais, provinces rich in hard stones, about the end of the 11 th century appears a cutting very well done with the narrow flat tool without chiseling. Then the dressed stones were entirely cut before setting, with no facing afterwards; the custom adopted by the workman after the fall of the Roman empire, of building in roughed rubble, set on thick beds of mortar, had caused t them to lose the tradition of dressing the surfaces after a setting. From the roughed rubble they came gradually to employ larger stones, and finally to cut stone, but continued to set it like rubble not surfaced afterwards; and they cut each block on the yard, taking care of the beds and joints as well as the surfaces. The structures of the 11 th century still seen in Burgundy and on the banks of the Saone present beautiful s surfaces, whose cutting in vertical lines on the flat surfaces and longitudinal ones on the mouldings are uniform everywhere, fine and close. In that epoch was frequently recognized the use of the lathe for columns and bases, and sometimes polishing for delicate mouldings within reach of the hands. About the same time in Auvergne, the cutting, although slightly n heavier than in Burgundy and Charolais, is well done and regular, sometimes enhanced by chiseling on the mouldings. Before the 12 th century in Isle-de-France the cutting is coarse and bad, recalling the Gallo-Roman monuments.

In Poitou, Berry and Saintonge, the cutting before the 12 th century is extremely rude, done with a thick tool cutting badly and crushing the surface, allowing to be seen everywhere t the strokes of the pick or point in roughing. Chiseling appears on the mouldings, but i is executed carelessly and by unskilful hands.

With the 12 th century, at the moment when was felt in the West the incluence of the Greco-Roman arts of Syria, cutting improved and very scon attained absolute perfection. In all the provinces, and notably in Burgundy, upper Champagne, Char-

Rosheim near Strasburg (12 th century) presents externally and internally surfaces cut with the broad chisel, as indicated by Fig. 4. It must be stated that the red sandstone of the Vosges can hardly be surfaced, except by the wide chisel, and the s stonecutters of that province take a certain pride in producing cuttings with such regularity and fineness as permitted b by the nature of the materials. In Isle-de-France our stonecutters in the 13 th century not only cut the surfaces, but a also the most delicate mouldings with the tooth chisel, which requires great skill of hand. This tool (the tooth chisel) has finer teeth as the mouldings become more delicate. In the 14 th century these mouldings often have such slenderness, that the tooth chisel cannot make them; then is employed the tooth scraper, a sort of curved chisel with very fine teeth, used perpendicular to the moulding (Fig. 5). Thus the stonecutter models his moulding as would an engraver, to make the different curve felt. The scraper is the tool solely employed in the 15 th century to finish all mouldings, and the tooth chisel is only used for flat surfaces.

In provinces in which are only very hard stones, such as c certain Jurassic limestones, sandstone, lava and even granite, men continued to use the point, chisel and flat chisel. The tooth chisel, and for a greater reason the tooth scraper, do not have sufficient power to work those materials. All the mouldings are separated yb the chisel and finished by the very narrow flat chisel used lengthwise. No traces ar seen of the tool called "boucharde" except on certain mounments in the South and built of hard sandstone, for example at Carcassonne, and that tool appeared only very late, about the end of the 15 th century. Still it is not quite certain that it was made like that too frequently employed today. It was a sort of great tooth chisel with teeth blunt instead of cutting. U Until the end of the 15 th century, stonecutting in France is done with great perfection, frequently with complete knowledge of the form and effect to be obtained. Plane surfaces are never treated like mouldings. The marks of the tooth chisel and later of the large scraper appear on those surfaces, while s scarcely visible on the moulded parts. Polished details then also give variety and value to this cutting.

With the 15 th century, too frequently carelessness, unifor-

uniformity and unintelligent work replace the qualities of the cutting prominent on our old edifices. Then since the middle of the 15 th century, men only employed in the work soft stones of fine and compact grain, like the stones of Vernon, Tonnerre and the densest from S. Leu. It was no longer possible to use the tooth chisel on those materials, but coarse and f fine scrapers. These tools have the inconvenience, particularly for plane surfaces, that if the workman does not have a light hand, of cutting deeper into the soft parts and refusing to attack those harder. It results that the scraped surfaces are wavy and produce the worst effect under the light just t touching them. Men then rub sandstone on those surfaces and make them plane, and this operation effaces the cutting, taking from it that warm grained surface, that so happily catches the rays of the sun. The mouldings and plane surfaces assume a uniform appearance, cold and soft, that gives a stone edifice the appearance of a structure covered by stucco.

TAILLOIR. Abacus. Article Abaque.

TAPISSERIE. Plane surface of stone.
Name given to all plane surfaces of stone, eithe in the i interior or on the exterior of an edifice. Men say:- "the plane surfaces (tapisserie) are well cut, to indicate that the surface is well made, plane, well faced or plastered.

TAPISSERIE. Fabrics for Hangings.
See Dictionnaire du mobilier francais.

TAS. Structure. Construction.
Entirety of the work where are set the various materials p prepared on the yard.

TAS DE CHARGE. Horizontal Courses over Piers, Columns, etc.
Courses of stone with horizontal beds placed over a point of support, on a pier or an angle of a wall between arches, to receive the upper construction. Also said of certain corbellings, as for example of the series of corbels that receive the buttresses o a curtain or tower (Art. Machicoulis).
One easily conceives that when several archer rest on the

top of a pier whose section is not large, the inclined beds of the voussoirs a (Fig. 1) do not present a bearing suitable to receive an upper load b. This tends to cause these voussoirs to slip or to crush them, because they present the angle of their extrados under its vertical action. Then (see B) in well understood constructions, where are left between the extradoses of those voussoirs horizontal courses c between the curves of the arches, or if space does not permit, there is placed a series of imposts d (see at C) with horizontal beds. (Art. Construction, Figs. 46, 46 bis, 48 ter, 49 bis, 81, 96 and 127). Sometimes the constructors of the middle ages have formed arches entirely composed of horicontal courses to avoid thrusts under a considerable load. Thus are jointed archivolts of the great openings of the two western towers of the cathedral of Rheims, so as to support the stone spires projected for those towers.

The absence of horizontal courses over piers has occasioned their crushing. This is found quite frequently in the structures of the end of the 12 th century. It is clear that if one joints the arches over a pier as drawn at a (Fig. 2), all the weight of the upper construction, s iding along the extrados of those arches, forms a wedge at b and exerts at that single point a pressure, that should have been distributed over the entire area of the pier. Arches near the crown e tend to crush at d and may be dislocated, only imperfectly abutting against the wedge of pressure. This only rests on its edge, and is c crushed, and the pressures acting very irregularly on the pier, break the courses. This accident is quite frequent, as we have just stated, in buildings erected in the 12 th century, when men had not acquired complete experience of the effect of great vaulted constructions resting on slender points of support, and must attract the attention of architects charged with the restoration of those structures. Frequently on perceiving crushed piers, although of important sections, one believes the insufficiency of the material employed, and is contented to replace the broken courses; that is the effect; but the cause is almost always in the imposts, that have no horizontal courses or beds above the capitals at the springing of the arches. It is then urgent to suppress this cause. The operation is of often dangerous and requires attention. To replace the crushed

courses of a pier in this case without starting anew with horizontal imposts with horizontal beds instead of voussoirs arranged as above, is to do useless work.

The accidents produced in edifices of the 12 th century by the absence or insufficiency of the horizontal courses were not lost upon the masters of the 13 th century. They soon came, as we demonstrated in Art. Construction, to give radial beds to the voussoirs only when their extrados left the vertical of the upper load (Fig. 3). This principle being once adopted, they derived numerous results from it; they frequentln succeeded in almost completely neutralizing the thrusts of arches on walls, or in diminishing considerably the volume and weight of the masonry intended to abut these thrusts.

The theory of that principle is this (Fig. 4); let there be a nave A with a cross vault, with triforium B and gallery C above at the springing of the great vaults, with sidi aisle D likewise with cross vaults. It is necessary:- 1, not to crush the cylindrical piers E; 2, not to have a considerable volume of the piers F of the flying buttress. The buttresses G are erected with a projection sufficiently pronounced to present not only a sufficient abutment for the vaults of the side aisle, but also a bearing sufficiently wide to resist an unequal pressure. The courses H of the buttress are cut horizontally at the springing of the transverse and diagonal arches of the vaults of the side aisles, so as to receive on their horizontal beds the overhand of the pier F at K. Likewise at L the courses at the springing of the flying buttress M are cut horizontally to receive the overhanging pinnacle N. The dotted line N O being vertically over the internal surface P, it is clear that if the flying buttress M did not exist, the entire system of the abutting pier would be in equilibrium with a tendency at the least movement , to overturn at L. Thus this pile of courses tends to incline towards the great vault, and consequently to exert a pressure on it. The flying buttress transmits tha pressure. Above the pier or column E, the courses are cut with horizontal courses at R, and receive the pier S on horizontal beds. The impost curves of the transverse and diagonal arches of the great vault T are cut with horizontal courses to transmit the pressure of the voussoirs to the pier V and the column E. Thus by the aid of these horizontal courses

is obtained the equilibrium of the general system. It is due to the equilibrium of the pier F, tending t incline toward the interior of the edifice, that the abutment of the flying buttress can be sensibly reduced. The capital of the pier E projecting more toward the nave than toward the side aisle, thus has its axis beneath the resultant of the pressures of the great vault, a resultant nearly vertical by the abutment of the flying buttress. The horizontal courses R also have the effect of preventing the thrust of the vaults of the side aisles, of bending the piers E toward the interior, in transferring the resultant of the pressure of these vaults to the axes of these piers.

According to this theory was constructed the very interesting church of Notre Dame of Dijon. Unfortunately the execution was careless, executed with too much parsimony and by workmen that did not perfectly understand the system adopted, leaving too much to be desired. Its conception is no less very remarkable and is due to a learned master. Bymaking the execution accord with the theory, this monument could be restored without too much effort. It is unnecessary to believe that t these structural combinations injure the effect, for certainly the church of Notre Dame of Dijon is one of the most beautiful monuments of Burgundy. There even results from this system of equilibrium a freedom of method, a clearness, that charms the least experienced eyes.

The masters of the 14 th and 15 th centuries were very wise constructors, and did not neglect to employ horizontal courses, and they comprehended their importance so well, that they took care to cut them in very high courses to suppress the c chances of rup ure. But in Art. Construction will be found n numerous examples of the use of this system of jointing.

TEMPLE. Commandery of Knights Templar.

Nine knights, companions in arms of Godfrey de Bouillon, v vowed before Garimond, patriarch of Jerusalem, to consecrate themselves to the holy land. [1] Living on alms, vowed to celibacy, devoting every instant of their lives to the protection of pilgrims, to destroy brigandage and to fight the infidels, they obtained from Baldwin II, king of Jerusalem, permission to live near the temple in a dependency of the palace of that

for holding the general chapters, for it was not permitted to them to lodge elsewhere. [1] In 1306, a year before the abolition of the order, the keep was completed; it had been commenced under the commander Jean le Turc (John the Turk). This k keep consisted of a very high square tower, flanked at the a angles by four turrets rising from the ground, containing stairs and watchmen. [2] The extent, beauty, richness and strength of the commandery at Paris instigated the accusation brought against them. In fact, the preceding year in 1306, the king Philip the Fair took refuge therein during the riots against the counterfeiters, and from that fortress he could await without fear the exhaustion of the popular rage. He then thought of appropriating to himself a safer residence, one more vast and splendid than were the palace and the Louvre.

Note 1.p.13. See Dubreuil, Theatre dis antiquitaties de Paris. Book III.

Note 2.p.13. In this keep Louis XVI was imprisoned in 1792.

The magnificent hospitality given to princes by the Templars, possessors of considerable wealth and wisely governed, could not fail to excite the cupidity of a sovereign as Philip the Fair. Later the hospitality that Louis XIV was willing to accept at Vaux was no less fatal to the superintendent Foucart.

The last knights of the Temple, who left Palestine and returned to the West 50,000 gold florins and considerable portable wealth. These treasures were only increased in their commanderies by an administration subject to a strict control. The mystery surrounding the deliberations of the order could further only exaggerate the opinion held concerning their wealth. As soon as they had been condemned and executed, Philip the Fair established himself at the commandery. As for the treasures, they passed into his hands and those of Pope Clement V, accomplice of the king in the iniquitous and scandalous p procedure. Later the commander of Paris and the commanderies of France were given to the knights of S. John of Jerusalem, [3] then of Rhodes and Malta.

Note 3.p.13. Only in 1317 by a transaction between the knights hospitaliers and Philip the Tall, it is proved that the sequestration of the property of the Templars was prolonged until 1313. Thus the crown had lost during a period of six years the enormous revenues of this property; and further,

all of the portable property and treasures remained in the ho hands of the king.

Sauval [1] exoresse himself thus on the subject of the temple; "It is a Gothic church, accompanied before the doorway by a little porch or old vestibule, and on entering is enriched by a dome, whose vault is that of the nave, and is supported by 6 great piers that bear the arches in the first story and as many piers in the second, which rise to the springing of the vault. This dome is surrounded by an aisle, whose vault is at a height equal to those arches. That entrance part is unique in its kind that I have seen in France, England and the 17 pr provinces, not only is it majestic and magnificent inside, but also it produces a surprising and pleasing effect by the view outside."

Note 1.p.14. Book IV, p. 454.

"The circuit of this place," says Corroset, [2] "the Temple, its dependences and gardens is very spacious, and larger than many a famous city of this realm; it is enclosed by strong wa-lls with turrets and wide galleries for two men to walk in f front. There are several chapels and lodgings in ruin, that serve for the meetings of the Templars, each with his nation. There are also several rich new buildings built by the knights of Rhodes, to whom was given the property of the said Templars, and consequently the said place of the Temple, whose church is built in the image of the temple of Jerusalem."

Note 2.p.14. Antiquitiez de Paris, by G. Corrozet, parision. 1586. part 1. p.108.

Collecting all the information that we have been able to pr procure on the Temple of Paris, [3] we give the plan of the chu-rch (Fig. 1). The rotunda dates from the first half of the 12 th century. After the Templars left Palestine, this rotunda was enlarged by the porch A, mentioned by Sauval, and a little later by the great nave B. The bottom of the tower C likewise dates from the 12 th century, and the belfry story from the beginning of the 13 th century.

Note 3.p.14. See the plan of Paris by Verniquet, the engrav-ings of Israel Sylvestre, and the work of Marot, L'architect-ure francoise.

The porch A was open in its lower part and glazed in the u upper. This arrangement was frequently adopted for cloisters

and produced a very picturesque effect here, as Sauval remarks. A longitudinal section (Fig. 2) shows the original arrangement of these structures added to the primitive rotunda. At A is t the porch with its lateral openings; above being the glazed windows. This is nearly the arrangement remaining at Aix-la-Chapelle, but better understood. The internal rotunda had retained its vaults and its upper story, that externally projected beyond the walls of the narthex and of the great nave. [1] The equilateral triangle was the generator of the plan of the rotunda. It is known that the equilateral triangle was one of the signs adopted by the Templars. Fragments of glass furnishde by M. de Penguern, and taken from the chapel of the commandery of Brelvennez, allow one to see the red cross surrounded by the golden orle of the Templars and the equilateral triangle. In the chapel of S. George of Gheac'h near S. Brieuc, are placed several tomb slabs of knights of the Temple. On one is e engraved a small Latin cross, and below is a sword placed diagonally; between the sword and the cross is an equilateral triangle. [1]

Note 1.p.18. Histoire des chevaliers templiers, by Elize de Montagnac. Paris. Aubry. 1864.

The freemasons have pretended to continue the order of the Temple and even to possess a tertament or charter of transmission from the grand master, whose secret authority was recognized by the brothers after the death of Jacques de Volay.

It should not be forgotten that the founders of the order of the Temple were nine in number (square of 3), and that these were not permitted to ordain new brothers till after 9 years, and that the numbers 3 and 9 appear frequently in the chapels of the commanderies. The great rotunda of Paris had 6 internal piers and 12 bays externally (Fig. 1). Its plan co could only be obtained by two equilateral triangles intersecting each other, as indicated by Fig. 3.

The chapel of the commandery of Laon, that dates from about the middle of the 12 th century, is an octagon whose sides internally are 9 ft. long. This chapel (Fig. 4) appears to have been built at one spurt, except the apse, that may have been a little later. It possesses a porch or narthex with gallery above, built afterwards, and which was in communication with the barracks of the commandery. The walls of the octagon are

bring against them the most iniquitous and most monstrous lawsuit, the king had with him the opinion of the feudal nobles, the clergy and monastic establishments. The mystery surrounding the Templars lent itself marvellously to the absurd accusations to which they were exposed. It is certain that the orders of Templars, Palestine being lost, became for the States of the West a great embarrassement, if not a great danger. The act of the State suppressing this order delivered the sovereign power from one of the numerous dangers that surrounded it, but took from it in the opinion of the people a part of the f faith in its justice and its moral grandeur, that Louis IX h had known how to impose on all classes in the country.

Note 2.p.18. Among the important castles that the Templars had built in Syria, we shall cite those of Tortosa (Antorsous), Safita, Areymeh, Toron and Athlit. These castles generally c contained a great square or rectangular keep, and their enclosing walls are likewise flanked by rectangular towers. "The castles of Safita, Areymeh, Athlit, and particularly the fortress of Tortosa," says M. G. Rey in his Essai sur la dominotion francaise en Syria, "furnish us with a series of types permitting the giving of a study as complete as possible of this art, whose best productions are found in the principalities of Antioch and of Tripoli, so rich, and especially the first, in Byzantine monuments." Tortosa on the seacoast was the last p place occupied by the Templars in the Orient. They only evacuated that fortress on June 5, 1291. In the West the Templars likewise adopted the square or rectangular plan for the construction of their keeps. On that principle was built the tower called Bichat, that was destroyed only in 1855. (Art. Tour).

THEATRE. Theatre.

During the middle ages no places existed intended for scenic representations. The mysteries, farces and mummeries, ballads recited by actors, were represented in the great halls of castles, churches and cemeteries, or on scaffolds built at street crossings, as practised at fairs. Only in the 17 th century d did men begin in France to erect halls designed solely for s scenic plays. The taste for the theatre, however, dates back to an early epoch, and there exist mystery and morality plays, that date from the end of the 12 th century.

TIERCERON. Rib of Vault.

Rib of a pointed vault turned between the transverse and side arches and ending at the lierne rib, which connects the crown of the transverse or side arch with that of the diagonal arches. (Art. Voute).

TIRANT. Tie. Tiebeam or tierod.

An inon rod or a timber that limits the span of the principals of a truss, or the distance between two parallel walls, or resists the thrust of an arch. The tiebeams in the carpentry of roofs are actual ties. (Art. Charpente). To cose their vaults, the constructors of the middle ages temporarily placed ties to avoid thrusts while waiting until the piers were loaded. These ties were generally timbers, and were sawn off flush with the intrados of the impost of the arches, when the construction was completed. At the cathedral of Rheims these ties were of iron with eyes hooked on hooks remaining in place. Few vaults of side aisles do not give opportunity for observing the traces of these ties.

TOILES, (Peintes). Painted Hangings.

Men frequently employed during the middle ages painted fabrics for hanging the interiors of apartments and for decorating great halls and churches. The treasury of the cathedral of Rheims still possesses a certain number of painted fabrics of the end of the 15 th century, that are of great intesest. These fabrics were attached to frames in the interiors of castles and of mansions, or simply suspended from the closets or cabinets improvised in great rooms were often composed of simple frames of wood hung with painted fabrics. (See Dictionnaire du mobilier francais).

TOMBEAU. Tomb. Grave.

Of all monuments, tombs are those that perhaps present the most extensive subject in the studies of the archaeologist, ethnologist, historian, artist and indeed of the philosopher. Civilizations on all steps of the ladder have manifested the nature of their belief in another life by the manner in which they have treated the dead. Suppress all idea of the duration of the individual beyond the earthly existence, and the tomb

no longer has a reason for existence. Now from the superior races of the blacks of South Africa, we see in all times men bury their dead with a more or less clear idea of a prolongation or transposition of existence. One could write the history of humanity by the aid of the tombs, and the day when a p people ceases to perpetuate the individuality of the dead by a monument, or some mark, society will cease to exist, at least such as continued during historical times. The worship of the dead is the cement that constituted the first societies, made of them permanent institutions and nationalities, i.e., the connection of the present with the past, perpetuity of tendencies, aptitudes, desires and regrets, hatreds anf vengeances. let the dead of a people be confused with an administrative routine of sanitation, and be treated decently, but like material whose decomposition must be treated to restore the elements the soonest possible to inorganic nature, as manure is treated; do only that among customs and nationalities, and t those traditional combinations, powerful and living, will bi no more than societies formed for a term of years, unless it is assumed that the most abstract metaphysical ideas of the existence of the soul are commonly accepted, as they can be by half a dozen philosophers in a country with several millions of inhabitants. It will be very difficult to cause to be accepted an absolute indifference for the perishable remains of a woman that has been loved, respected or known. Ind in our great cities, if there be one thing that shocks the popular feeling, it is called the common grave.

Only since the 16 th century has one thought to give to burials a funereal character; to surround them with emblems, attributes or allegories that recall the end, the decomposition, the sorrow without return, destruction, darkness and oblivion, nothingness. It is very singular that those ideas daily appear among peoples, who pride themselves on being Christians, and among whom the pulpit shows death as a deliverance, as the e end of the miseries attached to the brief earthly existence. By contrast, the pagans have given to sepulchral monuments a character rather triumphal than distressed. The middle ages r retained that same tradition, the tombs that it erected never adopted those funereal attributes brought into fashion since the 16 th century, those theatrical effects or cold allegories,

that always require the presence of a guide for explanation.

Death should not so disquiet people, since everyone must submit to its law; it seems unnecessary to surround it with all that frippery of melodrama, ungraceful and ridiculous. At the end of the Renaissance were erected the first mausoleums decorated by funereal allegories from diseased brains; bones of the dead, shrouds lifted by skeletons, corpses eaten by worms, etc. The art of the grand century could not fail to find that very beautiful, and the 18 th century even increased these po poverties. These middle ages that some always present to us as unhealthy, ascetic and melancholy, did not so take the matters of death, no more than the Greeks and Romans. As well known, those had the habit of burning the corpses, which had many advantages. Along the roads radiating toward the cities were erected tombs. This arrangement alone indicates sufficiently, that for those pagans burial did not produce those dismal ideas, that seize on us today in cemeteries. Those streets of tombs surrounding the suburbs of Rome did not prevent passers on the roads from entertaining less serious subjects, without causing the respect for the dead to be less profound. During the middle ages the cemeteries were not more seen from the dismal and romantic point of view. The middle ages had no fear of the dead, no more than in antiquity. If the Greeks 1 loved to sit and chat at the foot of the tomb placed beside the road, our ancestors voluntarily assembled in the cemeteries to treat certain affairs. At night those enclosures were indicated by a beacon, and at need served as a refuge to the traveler, who did not think of returning spirits, at least in our French provinces. Those cemeteries were nearly always surrounded by a low portico, and under that shelter the poor and the delayed traveler awaited the day, when he could no cause the gates of the city to be opened.

We shall not undertake the description of Gallo-Roman and Merovingian cemeteries. This work wa well done for a part of France by Abbe Cochet, [1] and will dispense with our speaking of the tombs of the first barbarous conquerors of Gaul, the more that those sepulchres assume no architectural appearance. These are burials in coffins of wood, stone, or even in earth, which have no interest except from the point of view of archaeology.

Note 1.p.22. La Normandie souterraine, by M. Abbe Cochet. P Paris. 1855.

It appeared that the custom of building tombs along the public roads was not entirely abandoned during the Merovingian period. Gregory of Tours cites several examples of this sort of monuments. [1] Later under the first Carlovingians, important personages preferred to be buried beneath the eaves of c churches, chapels or oratories. [2] This custom persisted until about the middle of the 12 th century. They also buried under the porches of churches and in adjacent places that were blessed. It was only at the end of the 12 th century that was established the custom of burial in the churches, and of erecting,monuments or of engraving memorial slabs over the graves.

Note 1.p.23. Bishop Arovatius "having returned to the city of Maestricht, was there attacked by a light fever of which he died. His body was washed by the faithful, and was interred near the public way." Hist. Franc. Book. II. Chap. 56

Note 2.p.23. Old French poem. Roman de Rou. Verse 5879 etc.

Contrary to the custom adopted among the Greeks and Romans, the first Christians did not burn the bodies, but they buried them in recesses made in the walls of crypts, or in sarcophaguses of stone or marble. If the persons were important, these sarcophaguses often remained visible in subterranean rooms; t they were decorated by symbolical sculptures or religious signs, the cross, monograms of Christ, doves, etc. They were generally placed on plinths or little columns to isolated them from the earth. These sarcophaguses consisted of an oblong rectangular case with cover in the form of a roof with two slopes or segmental. The body of the deceased was placed in that case. [3] The tombs of the middle ages proceeded from that principle. But about the middle of the 12 th century was placed on the lid the effigy of the dead, and then the sarcophagus was most commonly a mere imitation, and the body was placed under it in a grave or a little cell. It was also about this epoch that men were often satisfied by placing on the buried coffin an engraved slab or bronze plate representing the deceased. The principal part of the tomb, the sarcophagus or rather its imitation was soon merely an accessory, the real slab bearing r reclining figures, and besides these statues, the monument c consisted of elevated canopies or a sort of chapel in form of

a wide niche.

Note 3. p.23. We found in the abbey church of S. Denis beneath the pavement of the basilica of Dagobert several sarcophaguses of stone, wider at one end that the other. On the lid and an end of only one of those sarcophaguses are rudely incised pattee crosses; the other sarcophaguses are plain. These contained bones entirely reduced to dust, traces of fabrics a and threads of gold that were in the cloth, and some bronze tips of leather. (Deposited in the museum of Cluny). Several of these bodies were interred without heads, which causes one to suppose that the skulls were separately placed in shrines.

The tombs of the middle ages can then be divided into three series; the first comprises the sarcophaguses, properly so-called, more or less ornamented by sculptures, but without a representation of the deceased; visible sarcophaguses placed above ground; the second being the socles placed over a grave, sometimes bearing the effigy of the dead, and placed either in a sort of niche or little chapel, or under a shrine in the form of a canopy; the third being the flat tombs placed at the level of the pavement of churches, engraved or in relief, forming the cover of the grave containing the coffin.

Sarcophaguses actually containing the body without an effigy are rarely found after the 12 th century, but are very numerous during the Merovingian and Carlovingian periods.

Here (Fig. 1) is one of the forms assumed by those sarcophaguses.[1] During the 11 th and 12 th centuries rectangular sarcophaguses were still hollowed out, as during the Gallo-Roman period, with reliefs sculptured on the surfaces. We will cite among others the sarcophagus of S. Hilaire the Great of Poitiers, drawn by Gaignieres (Collection Bodleian), and which d dates from the 11 th century; those of the counts of Toulouse, placed against the wall of the south transept of S. Sernin of Toulouse, 11 th and 12 th centuries. The latter were placed on little columns in a sort of little external chapel about the end of the 12 th century. In the southern provinces, Provence, Languedoc and Lyonnais, the custom of depositing the c corpse in marble sarcophaguses long persisted; it was an ancient custom retained among these peoples. In the museum of T Toulouse are seen sarcophaguses of the 14 th century, that a absolutely take the form of the Roman sepulchral tubs, but

capital beneath the impost of a transverse arch. The body of the saint is wrapped in a shroud (Fig. 2), has a cross at its left side, and is placed on a sort of state bed supported by little columns; [1] on the sides of this bed is engraved the f following inscription. [2] On the front; + Saint Severinus. ++

On the right side; this stone signifies the sepulchre of S. Severinus.

On the left side; when he passed to the ages. V.

Note 1.p.27. On the sarcophagus of S. Hilary the great of P Poitiers is represented likewise the body of the saint placed on a sort of state bed; the archangel Michael is placed at o one side, a second angel at the other; then come several personages, saints and persons present. In the crypt of Aix-la-Chapelle, the body of Charlemagne, embalmed, was placed on a throne, clothed in his vestments, the crown on his head and a sword at his side.

Note 2.p.27. Due to the care of M. Durand, architect at Bordeaux, who had that inscription engraved, it has been possible to read it. -- See the Notice on that monument published by M. Durand. (Bordeaux. 1844).

To avoid confusion in this Article, we shall pursue the examination of tombs by retaining the classification just indicated.

As one of the most ancient tombs attached to religious monuments may be regarded the tomb seen at Toulouse between the buttresses of the buildings of the Carthusians. This monument of the 12 th century is well preserved, and consists of a sarcophagus placed in a recess elevated above the ground on little columns. An open arcade protects the sarcophagus. Fig. 3 presents the plan of this tomb, and Fig. 4 is its elevation and section. The little columns are of marble as well as the sarcophagus, the arcade being of stone, and the rest of the construction is of brick. This tomb was entirely painted. It is not known for what personage it was erected, but it is very certain that here the body was placed in the sarcophagus itself, resting on 5 little columns above the substructure, according to the custom still adopted in the 12 th century in the southern provinces, and which seems to be derived from very ancient traditions, foreign to Christian Gallo-Roman antiquity. A century later this custom of enclosing the body in a sarcophagus perched on little columns, as we have stated

above, was entirely abandoned in the northern provinces, and very rarely practised even in those of the South. Bodies were interred. Yet tradition influenced the visible forms of the tombs. One still sees in the cloister of the church of S. Salvy (of Alby) a tomb dating from the second half of the 13 th century, that presents an arrangement analogous to that of the monument of the Chartreuse of Toulouse given above. At S. Salvy the arcade did not protect the sarcophagus, but indeed the solid wall built over the grave and forming a substructure. H Here (Fig. 5) is the plan of the tomb of S. Salvy and its elevation (Fig. 6). The recess beneath which is placed the sarcophagus is divided by a pier against which is placed a statue.[1] Two little cross vaults cover that recess 3.2 ft. deep. Above the arche are placed three statues; the Virgin and two kneeling figures, a man and woman, who can only be the persons fro whom the tomb was built. These three statues are sheltered beneath a triple arcade crowned by a very obtuse gable. Traces of paintings are still found, that entirely covered the architecture and statuary. Angels fill the two tympanums of the lower niche over the sarcophagus, and we do not think that the man and woman in adoration at bath sides of the Virgin were represented on the slab covering their tomb. The engaged pier A (see plan) forms a cross detached on the two tympanums (see detail B, Fig. 6). A little holy water stoup i engaged in t the wall at the right side.

Note 1.p.29. This mutiloted statue is thot of S. Poul, probobly patron saint of the deceased.

At the sides of collegiate and parish churches habitually existed cloisters, and these cloisters served as burial places, no only for clerics, but also for laymen that paid very dear for that advantage of being interred near the church.[1] The preferred location was always the wall of the church itself. Thus beside our religious monuments between the buttresses that extended into a portico of the cloister, aee still f found numerous traces of those interments.

Note 1.p.31. Old Frence poem. Complointe of Froncois Gorin. 15 th century. Edition of 1832. Cropelet. p. 32.

In the 13 th century the ecclesiastical laws forbidding interment of the laity within the walls themselves of the church fell into disuse. The chapters of the cathedrals alone generally

reserved and replaced in the middle of the choir of the religious; it was that of Charles the Bald, which was of bronze with enameled parts, and which probably owed to the solidity of the metal, that it was not destroyed like the others. From the tomb of Dagobert remained under the cloister of the church of Suger a fragment mentioned by Dom. Doublet, [1] and that M. Percier d drew in 1797. This was a colored statue, seated and crowned, c clothed in a long tunic and a pallium. We reproduce here (Fig. 7) the fragment preserved by the drawing of Percier, and which causes one to believe, that this monument was not earlier than the beginning of the 12 th century. However that was, we have been unable to find a trace of this figure, no more than of th those of the two princes Clovis and Sigebert, that formed a part of the same monument. S. Louis no less erected a new tomb to the founder of the abbey, and placed it at the entrance of the sanctuary on the epistli side. [2] That tomb consequently d dates from the middle of the 13 th century, and is one of the most curious funerary monuments of that epoch. It consists (SFig. 8) of a great niche surmounted by a gable; at the bottom of the niche is placed a sanctuary,[3] whose cover serves as a b bed for the statue of the king lying on the left side. At the back of the niche is developed on supperposed bands the legend relating to the death of Dagobert.

Note 1.p.32. "At the entrance of the said doorway,"(that of the transept lookink south, in the cloister of the religious), "entering these cloisters, on the right hand is seen the effigy of the very Christian king Dagobert, of unusual size and seated in a chair, the crown on his head and a ball in his right hand; having at its two sides the effigies of his two sons Clovis a and Sigebert, in lias stone." Dom. Doublet, Antiq. et rech. de l'abbaye de S. denis en France. Book I. Chap. 14.

Note 2.p.32. This tomb is now replaced on the same spot, after having been transferred to the museum of French monuments, then restored to the church, where the two fronts are separated to form opposites, and are placed at both sides of the northex.

Note 3.p.32. This sarcophagus was feigned, for the corpse of king Dagobert had been deposited under the high altar of the primitive church; perhaps it was enclosed in the coffin, whose lid and end we have given, decorated by pattee crosses.(Fig. 1,A). Yet the stone replaced in the reign of S. Louis had been hollowed

as if to deposit a body there, and remains of bones were found there at the violation of the tombs in 1793.

Standing at the sides of the royal effigy are the statues of Nantilde, second wife of Dagobert, and of Sigebert, his eldest son, who were buried near him. On the arches covering the niche are sculptured angels bearing censers, and in the tympanum of the gable, Christ and two bishops, S. Denis and S. Martin, in company with S. Maurice, who delivered the soul of the king f from the hands of demons, and led him into Paradise. The front of the sarcophagus is covered by fleurs-de-lis, as well as the base. [1] Tha entire monument was painted; besides the still v visible traces of those paintings, the sketches of Percier furnish all the details of the coloring. This tomb not being colossal, allows its rear part to be seen in the side aisle. That is also surmounted by a gable with figures, crockets and cross-flowers, the lower part remaining plain without coloring.

Note 1.p.33. This sarcophagus must have been rebuilt as well as the reclining statue and that of Sigebert, which were lost in the successive transfers that this monument suffered. Further the sarcophagus and the two statues were copied as faithfully as possible from the drawings that Percier made of this tomb before its transfer to the museum of Petits-Augustins. The primitive sarcophagus, according to the statement of Dom. Doublet, was of gray porphyry, bu the fragments that we have had in o our hands were of soft grayish sandstone.

Certain parts of the statuary of the tomb of Dagobert are v very remarkably treated, The statue of Nantilde, to which at t the museum of Petits-Augustins M. Lenoir had fitted the head of a man, [1] the groups of bishops in the bands of legends, the angels of the arches, the sculpture of the tympanum below the gable, are in excellent style and perfect execution. This tomb is not in the style of one of those shrines placed in the interior of churches; it is a chapel, one of the little structures erected in cloisters between the buttresses of churches, and that is why we have presented it here; yet the effigy of the deceased is sculptured on the true or false sarcophagus, while neither the tomb of Toulouse nor that of S. Salvy of Alby had reclining statues.

Note 1.p.35. It must be noted that this statue, so ridiculously disfigured, has been cast, reduced and sold everywhere as

one of the remarkoble works of the middle oges.

Here againis one of those monuments in the form of a niche without effigies; it is that of the two prelates Baldwin II and Baldwin III, bishops of Noyon, who were placed against the wall of the abbey church of Oarscamp at the gospel side (Fig. 9). [2]

Baldwin II died in 1167. The epitaphs were painted on the ma walls of the niche, and had been replaced a century before Gaigneres, from whom we borrow this drawing, by inscriptions on vellum placed in frames attached by little chains. Here as at . S. Salvy the little pier forming the arcade rests on the sarcophagus and protects its lid. Thes tomb presents no funereal attributes, no more than those of S. Salvy or of Dagobert. Flowers, foliage, legendary subjects, where personages nowise assume the attitudes of sorrow, ornament these shrines and make them works of art agreeable to see, where nothing causes a thought of material decomposition, of eternal night. On the tombs on the contrary, the artists of the middle ages affect to scatter flowers and leaves in profusion, just as done around the body at the moment of interment. [3] Animals, hunts, processions of personages, on those monuments recall life and not death. When the effigies of the dead are sculptured as reclining on the sarcophagus, they assume the attitude of death only very late. Habitually these figures during the 12 th and 13 th centuries have their eyes open, the pose and attitudes of living persons. About the middle of the 14 th century the statuaries sometimes give them the appearance of slumber, but without any signs of death. These personages are further clothed and armed, if warriors, covered by religious vestments, if clerics.

Note 2.p.35. This tomb dotes from the first yeors of the 13 th century.

Note 3.p.35. We hove very frequently found under the remoins of persons buried during the 12 th, 13 th and 14 th centuries still visible loyers of plonts ond flowers, notobly of roses e eosily recognizoble by their bronches with thorns. Wos it not more sensible to beor this regretted person to his lost obode , thon to ploce his body in those block ond white heorses of such ridiculous forms, decoroted in the worst toste, driven by coochmen dressed in burlesque foshion?

Before speaking of tombs forming isolated structures, it is also necessary for us to cite some of these monuments in the

one of the remarkable works of the middle ages.

Here againis one of those monuments in the form of a niche without effigies; it is that of the two prelates Baldwin II and Baldwin III, bishops of Noyon, who were placed against the wall of the abbey church of Ourscamp at the gospel side (Fig. 9).[2]

Baldwin II died in 1167. The epitaphs were painted on the walls of the niche, and had been replaced a century before Gaigneres, from whom we borrow this drawing, by inscriptions on vellum placed in frames attached by little chains. Here as at S. Salvy the little pier forming the arcade rests on the sarcophagus and protects its lid. Thes tomb presents no funereal attributes, no more than those of S. Salvy or of Dagobert. Flowers, foliage, legendary subjects, where personages nowise assume the attitudes of sorrow, ornament these shrines and make them works of art agreeable to see, where nothing causes a thought of material decomposition, of eternal night. On the tombs on the contrary, the artists of the middle ages affect to scatter flowers and leaves in profusion, just as done around the body at the moment of interment.[3] Animals, saints, processions of personages, on those monuments recall life and not death. When the effigies of the dead are sculptured as reclining on the sarcophagus, they assume the attitude of death only very late. Habitually these figures during the 12 th and 13 th centuries have their eyes open, the pose and attitudes of living persons. About the middle of the 14 th century the statuaries sometimes give them the appearance of slumber, but without any signs of death. These personages are further clothed and armed, if warriors, covered by religious vestments, if clerics.

Note 2.p.35. This tomb dates from the first years of the 13 th century.

Note 3.p.35. We have very frequently found under the remains of persons buried during the 12 th, 13 th and 14 th centuries still visible layers of plants and flowers, notably of roses & easily recognizable by their branches with thorns. Was it not more sensible to bear this regretted person to his last abode, than to place his body in those black and white hearses of such ridiculous forms, decorated in the worst taste, driven by coachmen dressed in burlesque fashion?

Before speaking of tombs forming isolated structures, it is also necessary for us to cite some of these monuments in the

one of the remarkable works of the middle ages.

Here againis one of those monuments in the form of a niche without effigies; it is that of the two prelates Baldwin II and Baldwin III, bishops of Noyon, who were placed against the wall of the abbey church of Ourscamp at the gospel side (Fig. 9). [2]

Baldwin II died in 1167. The epitaphs were painted on the wa walls of the niche, and had been replaced a century before Gaigneres, from whom we borrow this drawing, by inscriptions on vellum placed in frames attached by little chains. Here as at . S. Salvy the little pier forming the arcade rests on the sarcophagus and protects its lid. Thes tomb presents no funereal attributes, no more than those of S. Salvy or of Dagobert. Flowers, foliage, legendary subjects, where personages nowise assume the attitudes of sorrow, ornament these shrines and make them works of art agreeable to see, where nothing causes a thought of material decomposition, of eternal night. On the tombs on the contrary, the artists of the middle ages affect to scatter flowers and leaves in profusion, just as done around the body at the moment of interment. [3] Animals, hunts, processions of personages, on those monuments recall life and not death. When the effigies of the dead are sculptured as reclining on the sarcophagus, they assume the attitude of death only very late. Habitually these figures during the 12 th and 13 th centuries have their eyes open, the pose and attitudes of living persons. About the middle of the 14 th century the statuaries sometimes give them the appearance of slumber, but without any signs of death. These personages are further clothed and armed, if warriors, covered by religious vestments, if clerics.

Note 2.p.35. This tomb dates from the first years of the 13 th century.

Note 3.p.35. We have very freauently found under the remains of persons buried during the 12 th, 13 th and 14 th centuries still visible layers of plants and flowers, notably of roses e easily recognizable by their branches with thorns. Was it not more sensible to bear this regretted person to his last abode , than to place his body in those black and white hearses of such ridiculous forms, decorated in the worst taste, driven by coachmen dressed in burlesaue fashion?

Before speaking of tombs forming isolated structures, it is also necessary for us to cite some of these monuments in the

form of niches or chapels, but with effigies of the dead placed on the sarcophagus. In the side aisle of the choir of the cathedral of Rouen exists one of these tombs belonging to a bishop, which dates from the end of the 12 th century, and which is of very beautiful work. This monument otherwise presents no remarkable peculiarities. The statue of the prelate rests beneath a niche surmounted by a low gable. As always, this tomb was painted.

Here is another (Fig. 10), [1] which was placed at Fontevrault against the wall of the side aisle at the right of the main altar (gospel side). It was that of bishop Pierre of Poitiers ((13 th century). The statue lies on a draped bed and is surroounded by little figures in the round representing the religious present at the funeral of the bishop. Among these religious are distinguished the abbess of Fontevrault and an abbot, both holding the crozier, the mark of their dignity. The other persons carry crosses and candles. The chasuble of the bishop was of greenish blue with crosslets of gold repeated in red; his white mitre with a red band, the alb white, stole green, and t the shoes black. The abbess was clothed in black, and of the religious, some were in white and others in green, detached on a red ground. An arch covered the sarcophagus, but it was already destroyed in the time of Gaignieres, who left us the drawing of this curious monument.

Note 1.p.37. Collection Gaignieres. Bodleian Library of Oxford.

One still sees in the cathedral of Limoges against the north aisle one of those tombs in the form of niches or chapels, dating from the 14 th century; it is that of a bishop Bernard Brun. This monument is engraved in the work of M. Gailhabaud. [1] At the back of the niche and separated by a middle pier, reliefs represent subjects from the legend of S. Valeria, a crucifixion, a coronation of the Vorgin and a last judgment. It is also necessary to cite two pretty tombs belonging to the same epoch, and that are placed against the wall of the chapel of the Virgin in the cathedral of Amiens. They are in the form of a niche covered by a low arch surmounted by a gable. On the base bearing the reclining statues of the dead, are sculptured in little n niches religious persons, canons and laymen, who compose the procession accompanying the bodies to their last habitation. T The shields of arms of two personages, a bishop and a canon, are painted at the back of the niches.

Note 1.p.38. L'architecture et les arts qui en dependent.

One of the most interesting funerary monuments, taking the form of a niche with figures, is that of the tomb of the priest Bartholomew, placed in the church of Chenerailles, of which he was probably the founder. This tomb is engaged in the third bay of the south side, is placed 6.6 ft. above the pavement, and is cut from one block of limestone. Its architecture presents a pointed arch with two buttresses. The recess is divided in zones, in each of which are detached persons in the round. The lower zone represents the scene of the interment of the dead. The Holy Virgin occupies in the middle zone the summit of a little shrine with stairs. S. Martial climbs the stairs with a censer in his hand. On the ground at the right of the Virgin is represented the martyrdom of S. Cyr and of his mother S. J Julite. At his left the priest Bartholomew, kneeling, is presented to the infant Jesus by his patron and S. Aignan, bishop. Beneath the arch is sculptured a crucifixion. On two scrolls placed under the first and second zones are read a Latin inscription.

Note 2.p.38. See in Annales archaeologiques, Didron, the Notice of Abbe Texier on this monument, and the engraving of M. Gaucherel. Vol. IX. p. 193.

The sculpture of this little monument is in mediocre style, but its composition is happy.

Here (Fig. 11) is another example of those engaged tombs in the form of a niche with an effigy of the dead. This example dates from about 1300. The name of the deceased is not preserved. This tomb was later inserted in the wall of the north side aisle of the church of S. Pere (S. Pierre) sous Vezelay. The back of the recess is occupied by a relief on a good style. At the centre the seated Christ receives from S. Pierre kneeling a broken object that he holds in his left hand. On the other side the Holy Virgin seems to intercede with her divine Son. Two angels bearing censers terminate the scene. Evidently the Virgin of S. Pierre causes to avail with the supreme judge the merits of the dead, who might be one of the founders o parts of this church rebuilt about the end of the 13 th century. Was the object held by S. Peter the model of the restored church? that seems possible. This monument is also much mutilated, and the statue of the person in civil clothing is completely defaced.

fortified from the highest antiquity, to arrest invasions from beyond the Rhine. Much before the Romans there were indeed bloody combats on that natural barrier, where every Cymric, Celtic or Germanic invasion, saw arise new works, of defense, upon which the Gallo-Roman epoch left a last impression."

"Thus doubtless the tombs described above are found mixed w with the remains of a more ancient epoch, like the great double walls of Gros-Limmersburg, where I cannot recognize Roman art."

"The coin of Titus found at Kempel, as well as the good fabrication of the vase discovered at the same place, announce t that these necropolises existed from the earliest times of the Christian era."

"These tombs have nothing Germanic; they are Gaulish of the Roman era. Their special character consists in the little opening that they have at their bases, and in the pointed arch that generally terminates their tops."

"The opening of the base is difficult to explain without admitting that this may be a means of communicating with the ashes of the dead and of making libations."

"The pointed arch, whose exact image is found in the funereal monuments of Asia Minor, might it not be the indication of a tradition preceding the Celtic invasion, that was preserved by a tribe camped on the summit of the Vosges?"

In fact, Lycian tombs in great number terminate at their tops by a sort of lid or cover imitated from a wooden structure, and assumes the form of a curvilinear prism, [1] and penetrating into the extreme Orient, one finds Hindoo tombs presenting the same geometrical appearance. Without attaching more importance to t these relations than is proper, it is necessary to take them into account, for we see that form for covering the body persist among the peoples that come from the northern Orient.

Note 1.p.42. Among others, see the beautiful examples of those tombs deposited in the British museum.

The Salic law mentions the construction, balustrade, little edifice or little bridge, placed over the dead man. [2] Gregory of Tours, [3] concerning a theft with breaking committed in the basilica of S. Martin of Tours, says that the thieves entered by a window by climbing a grating that they had removed from the tomb of a dead man (Latin text). The Anglo-Saxons had a custom of placing on the tomb of the dead a sort of cradle of wood

or iron (bier); that was covered by a pall.[4] Now the form of the Lycian tombs, and that of the tombs of the Vosges, indicate the "aristato"[5] cited by the Salic law, the bier of the Anglo-Saxons, the catafalques represented in the embroideries of Bayeux (called the tapestry of queen Matilda); and although the stones of the Vosges cover the cinerary urns, and that neither the Franks nor the English burned their corpses, it is difficult not to admit a similar origin for that form of tomb, representing a pall covering a frame of wood or iron. Observe that this aristato or bier covered, not the dead bu the sepulchre of the dead; it is what we call today a catafalque. It is not the bier, but the honorable and visible sign that indicates t the place of the tomb.

Note 2.p.42. No. 5 of the text states:-"If some one has destroyed the little edifice, which is the little bridge," let it be done to him according to the custom of our fathers.

Note 3.p.42. Book VI. Chap. 10.

Note 4.p.42. See the work of Dr. Rocky- The Church of our f fathers, and the Notice of M. Feydeau, Annales Archaeologiques. Vol. XV. p. 38. -- See the monument of Beauchamp.

Note 5.p.42. See Ducange, Gloss.

The Lycian tomb deposited in the British Museum presents that curious peculiarity (Fig. 14), that the sarcophagus A, properly so-called, which is of marble, and in which were deposited the remains of the dead, assumes the shape proper for that material, while the part P C is a covering, although likewise cut in blocks of marble, but takes the appearance of a wooden structure. the curvilinear top C i even covered by a pall imitating a fabric with embroidery in very low relief, and the metal ornaments that this pall can receive by the projecting muzzles of lions. In this tomb, there is then the tomb proper and the catafalque over it. Same arrangement on a small scale in the tombs of the Vosges, for the tombs mentioned y Gregory of Tours; and for t the monument of Beauchamp, where the effigy of the dead is placed on the sarcophagus and covered by an iron bier on which was placed the pall. Same arrangement adopted for the tomb of the religious William, formerly placed near the door of the chapter in the cloister of the abbey of Noaille (Fig. 15), and which d dates from the end of the 12 th century.[1] This stone is nothing but the catafalque, the representation of the aristato, of the



pall placed on a frame and covering the place where reposes th the dead.

Note 1.p.43. See the portfolios of Gaignieres, Bodleian Liby.

But here is an interesting example, that presents itself and gives greater value to the preceding observations. The little church of S. Dizier in Alsace contains several tombs, among o others that attributed to S. Dizier, bishop says the legend. This tomb further does not date beyond the middle of the 12 th century, and is nothing but a stone hollowed in the form of a little cell with two doorways (Fig. 16). The cell is monolithic and is terminated in its upper part by two slopes covered by r rich ornaments. "Until in 1835," says M. Anatole fe Barthelemy, from whom we borrow this detail, [1]"they caused to pass thhough these openings persons attacked by mental alienation." Here is the aristato or pall, the antique catafalque covering the body of the saint, and possessed of miraculous properties. The body is buried and its place is consecrated by this shrine, that a always reproduces the arrangement found in Lycia, on the summits of the Vosges, at the abbey of Noaille, and that we shall see developed wit: the art of the 13 th century at its climax.

Note 1.p.44. Annales archaeologiques. Vol. XVIII. p. 49.

Let us cite the charming tomb of S. Etienne, placed in the church of Obazine. The reclining effigy of the saint is protected from contact by an open arcade; above the arcade is a rich pall forming a roof with two slopes and covered by reliefs. Monks leave their coffins and come to prostrate themselves before the Virgin. Angels holding torches appear at half length between the gables sculptured on the slopes and terminated by foliage crestiug. [1] But we see how is perpetuated this memorial of the antique tomb. In the cemetery that still surrounds the church of Montreal, one notes several tombs of this form (Fig. 17). This stone in form of a crossed roof on the walls covers the grave. Sketch A gives the detail of the three gables of the rear end of the cross arm. As for the gable B of the front end, it has a little niche with cup forming a holy water stoup. Does not one find there a last trace of antique traditions Christianized? But this arrangement must furnish architectural motives rich otherwise. Only persons of small importance were interred in the cemeteries, while after the 13 th century the churches were reserved for the burial of the great. Besides the tombs

beacon was lighted at night within their enclosure. Some tombs of the middle ages still have iron candlesticks intended to be bear tapers and the tombs erected by Louis IX at S. Denis adopt that method.

Note 1.p.48. See Syrie centrale, the work by count Melchior de Vogue.

Fig. 18 represents one of those double tombs. [2] This arrangement is very original, but does not appear to be an exception, for one frequently notes on the sides of the bases receiving t the effigies of the dead, traces of supports of stone, metal or even of wood, bearing those candlesticks for tapers and perhaps palls of cloth. The tombs with fixed canopies of stone or wood are only a derivative from the same principle. Many of these were formerly seen in our abbey churches at Royaumon , the abbeys of S. Denis, Longpont, Eu, Braisne, S. Seine and Poissy; at the Jacobins and Celestins of Paris. Some cathedrals likewise possessed them, Amiens, Rouen, and Sens. They are still seen around the choirs of those of Limoges and of Narbonne.

Note 2.p.47. All the effigies of these tombs are old, replaced recently in the transepts, where they were before 1793. The bases, backs and little columns, were restored after the drawings of Gaigneres and from fragments deposited in the storerooms of the abbey.

Here among others is the tomb of Charles, count of Etampes, grandson of Philip the Bold, that was placed behind the great altar in the church of Cordeliers at Paris, [1] This count of Etampes died in 1336 (Fig. 19). The statue in white marble rests on a slab of black marble with plinth ornamented by arcades of white marble on a black ground. A canopy of charming work protects the head; the epitaph is engraved behind the canopy. The open structure of stone was entirely painted and gilded, and the plan presents a curious arrangement. Established between two great piers behind the choir, this plan is so drawn as to escape those piers and to leave the architecture of the canopy free (Fig. 20). [1] The vaults were painted blue with gold fleurs-de-lis, and the little buttresses were overlain by panels of glass painted underneath, like those seen in certain parts of the S. Chapelle of Paris.

Note 1.p.49. The white marble effigy still exists at S. Denis. This is a statue of admirable work.

Note 1.p.50. See the portfolios of Gaignieres, Bodleian library of Oxford.

Sometimes the base supporting the statue was perforated; such was the tomb od a lord of Coucy placed between two piers at t the left of the great altar of the abben of Longpont, and that dates from the end of the 13 th century. [2] Like the preceding, this tomb was entirely painted. The warrior's costume of the personage belongs to the last years of the 13 th century.

Note 2.p.50. This tomb no longer exists, but it is reproduced by Goignieres, and although he does not give the epitaph, t the arms (fessy of voir and gules) leave no doubt of the rank of the personage.

To maintain the integrity of a principle and to deduce therefrom very different consequences, is the result of an art that has found its path. The programme of the catafalque monument was adopted after the 13 th century for the interment of important personages, by preference to the tomb in form of a niche; yet what a variety in no only the details of this little structure, but also in the mode of interpreting the programme! For example, here (Fig. 21) is also one of the funerary monuments of the abbey of Longpont, that was placed at the left of the great altar. It is that of a woman. The effigy of the dead is no longer placed on the credence covering the place of interment, but beneath that perforated credence, while a richly decorated crucifix is laid on the credence. A structure nearly similar to the preceding covers this image. [1] This tomb dates from the middle of the 14 th century. We also cite among the most r remarkable catafalque tombs of this epoch that of archbishop Pierre de la Jugee, placed between two piers of the choir of the cathedral of Narbonne (southern side). Why were the statue and one of the charming reliefs of this tomb removed to be deposited in the museum of Toulouse? We cannot say. Why does not the cathedral of Narbonne reclaim those fragments, so as to restore them? That can be explained only by a profound indifference for those precious remains, become so rare in our old churches, and yet left to neglect or even daily deterioration, when the authorities do not remove them to place some new decoration in equivocal taste. This tomb of the cathedral of Narbonne, although mutilated in the most barbarous manner, is still a real jewel, retaining its paintings in charming taste and

statuettes in excellent style.

Note 1.p.51. See the collection of Gaignieres, Bodleian Library of Oxford.

We give its plan (Fig. 22). The choir being 3.3 ft. above t the side aisle, on that side a lower row of reliefs compensates for the difference in level. Fig. 23 gives the section of the monument with an indication of the paintings found above the head of the prelate. Two angels carry his soul to heaven. Beneath the side arch,quatrefoils with the arms of the deceased alternate with the birds facing each other. The vaults are painted blue, and all the mouldings are in varied tints with very happy harmony.

Fig. 24 gives the front of the tomb next the side aisle. The two reliefs in hard alabaster represent, the upper one bishops in niches with gables, the lower one canons in pairs present at the obsequies. This tomb, as well as some others still existing in the cathhedral of Narbonne, forms an enclosure of the choir. The same arrangement exists at Limoges, and existed at Amiens before the establishment of the ridiculous decorations in plaster, that dishonor the choir of the cathedral, and that are due to one of its bishops of the last (18 th) century. 1

Note 1.p.52. Among these ornaments in deplorable taste, that replaced precious monuments, whose character if not their value as art should at least have made them respected, it is necessary to mention a certain Glory of gilded wood, that casts its rays of carpentry and its clouds of plaster on the piers of the apse up to the height of the gallery, thus destroying the marvellous effect of this apse with its apsidal chapel.

Among the tombs of the cathedral of Limoges we cite that placed between the piers on the south side of the choir. This tomb of a bishop presents one of those original arrangements, that the artists of th middle ages always knew how to invent. A p perspective drawing (Fig. 25) will show the effect from the s side aisle. Two censer bearers open a curtain, that allows the recumbent statue of the prelate to be seen. The vault of the little structure is a tunnel vault, and reliefs decorate its piers. Before the base two canons are sculptured in little niches. This monument likewise dates from the 14 th century. This arrangement was retained until the epoch of the Renaissance, and we possess a great number of representations of tombs with more

or less rich canopies, protecting the effigy of the dead. One again finds the application of this principle in the celebrated tombs of Louis XII, Francis I and Henry II, erected at S. Denis. Yet the programme of the 13 th and 14 th centuries is modified in one capital point. In these last monuments, the personages are represented in the appearance of death beneath the cenotaph; clothed, alive and kneeling above it. The monument covering the tomb of Francis I shows no only nude figures of the king and of queen Claude beneath the cenotapr, but also on the top are the same figures kneeling, clothed and accompanied by the dauphin Francis, prince Charles of Orleans and Charlotte of France, who died at the age of eight years. Let us state in passing, that this tomb, attributed by some to Italian artists, is due to Philibert de l'Orme as architect; to Pierre Bontemps, master sculptor, citizen of Paris, who by the contract for 1699 1 livres dated Oct. 6, 1552, engaged to execute a part of the celebrated reliefs of the stylobate representing the coronation: to Germain Pilon, who executed for 1100 livres the eight figures of Fortune(below the vault of the cenotaph); to Ambroise P Perret, who made the four evangelists; and finally for the ornamentation, to Jacques Chantrel, Bastille Galles, Pierre Bigoigne and Jean Bourgy. The beautiful recumbent figures belong to the French school, and appear to have left the studio of Jean Goulon. As for the statuary of the tomb of Henry II, it is entirely by the hand of Germain Pilon. [1]

Note 1.p.58. For more ample details of those tombs, see Monographie de l'eglise royale de S. Denis, by Baron de Guilhermy. 1848.

From the end of the 15 th century, many funerary monuments adopt this arrangement of a representation of the deceased beneath the cenotaph, and of the same person living and kneeling on its covering; then they come sometimes to suppress the effigy of the corpse, only showing the figures of the personages kneeling on a base or on the imitation of a sarcophagus. Yet so far as we know, those compositions do not appear in full before the second half of the 15 th century.

In the 16 th century, they become quite common. The tomb of Charles VIII at S. Denis presents this arrangement.

Charles VIII died April 7, 1498, and consequently his tomb already belongs to the style called the French Renaissance.

It was very beautiful, [2] and has been engraved several times. Gaignieres gave a good drawing of it in his collection. As a corollary of these cenotaph tombs, it is necessary to cite t the monuments attached to the walls, which present on a vert- 1
ical surface all parts constituting a mausoleum with substructure, image of the dead and a canopy.

Note 2.p.56. See what Dom. Doublet says of it; (Hist. de l' abbey de S. Denys en France, 1635. Book IV. p. 1293):- "His effigy (of the king Charles VIII) clothed in royal robes, and on his knees over the tomb, is represented from nature in cast iron; the top of the said tomb is covered by gilded copper, on which is placed a crown with an open book, likewise of gilded copper. Also at the four corners are four angels of cast iron well gilded and wrought, that hold the shields of arms of the kingdoms of Naples and of Sicily, also of cast iron, gilded a and painted. At the sides of the tomb are round niches, and within are basins of copper well gilded, and in these basins a are low figures of cas iron, well gilded."

D. Millet in his Tresor sacre de l'abbaye royale de S. Denys en France, 1640, says:- "His sepulchre (of the king Charles VIII) is the most beautiful in the choir, on which one sees his effigy represented of natural size and kneeling, a crown and book on an oratory (bench), and four angels on their knees at the four corners of the tomb, all of gilded copper, except the effigy, whose robe is blue, sprenkled with fleurs-de-lis of gold."

Note 1.p.57. From Bodleian Library. See the engraving of the work of Felibien. Abbey royale de S. Denis.

These sorts of monuments are now very rare in France; the lack of space and also the want of money sometimes cause the adoption of this method. We know two beautiful examples of them in the old cathedral of Carcassonni. One dates from the middle of the 13 th century, that of bishop Radulphe. The image of the sarcophagus, which persists late in the southern provinces of France, is placed on three little columns and seems engaged in the wall. Canons under an arcade are present at the obseouies. Standing on the sarcophagus in relief is the figure of the bishop blessing. A gable decorated by cross-flowers and crockets crowns the whole. The other tomb (Fig. 26) dates from the beginning of the 14 th century; it is that of bishop Pierre de

Roquefort, who caused the choir of the church to be rebuilt, with two chapels adjoining the transepts. [2] This monument, as our drawing shows, presents in the flat, let us say, the arrangement of cenotaph tombs; the bishop does not lie on the base, which is only a facing, but stands on it; he is covered by a slab canopy; a canon and a deacon accompany the principal figure in two lateral arches. As we said, this arrangement is rare in France, and we know of no example still existing in the provinces of the North.

Note 2.p.57. Art. cathedrale, fig. 49. The tomb of Pierre de Roquefort is placed against the western wall of the north chapel. This prelate died in 1321.

It remains to us to speak of horizontal tombs with effigies in relief or simply engraved on stone or metal. These tombs are of two kinds: either the effigies of the dead are placed on a very low base, presenting a slight projection above the floor, or they are flush with it, so as to permit one to walk on it as on a pavement. We do not doubt that the first of these tombs were covered by cloth hangings on anniversaries or on certain solemn days, and we give as proof thereof the metal fastenings or the pins, whose traces are frequently found along the bases. For the second, they were only a visible sign indicating the place of interment.

There exist horizontal tombs of a quite early epoch, i.e., dating back to the 12 th century, but while presenting little relief, they project sufficiently over the ground that one cannot walk on them, while only about 1225 men commence to see horizontal tombs on the level of the ground and only engraved.

However it is necessary to mention here a very singular tomb, formerly placed in the choir of the church S. Germain-des-Pres at Paris, and that is now deposited at S. Denis; it is that of Fredegonde. Dom. Bouillard [1] claims that this princess was interred in the basilica of Ss. Croix and Vincent, at the north side near the great wall supporting the tower. The existing tomb does not date back to the first half of the 12 th century. It is a facing of lias stone overlaid with fragments of glass pastes and hard stone, mingled with strips of copper. Recesses left in the stone form the outlines of the clothing. The head, hands and feet are entirely plain today, but very probably were painted. We know no other example of this kind of funerary mon-

monument; [2] it is difficult to discover the motives causing the religious of S. Germain-des-Pres to execute this monument by a procedure so little used. Was it to imitate a much older mosaic made as cloisonnee after the indications of Byzantine artists? Was it the attempt of a western artist? We cannot say. Other horizontal tombs in mosaic exist, among others being that of Frumaldus, bishop of Arras, dying in 1180, [3] and that found in the ruins of the abbey of S. Bertin, with the date of 1109; but these tombs are executed according to the ordinary procedure of the mosaicist employed in Italy and France in the 12 th century, a procedure nowise resembling that adopted for the effigy of Fredegonde.

Note 1.p.59. Hist. de l'abb. roy. de S. Germain-des-Pres. Paris. 1724.

Note 2.p.59. This tomb has been reproduced frequently by engraving and chromolithography; (see Statistique de Paris, by M. Alb. Lenoir; the work of M. Gailhaboud, l'architecture etc.; D. Bouillard, Hist. de l'abb. de S. Germain-des-Pres; Alex Lenoir, Musee des monuments francais; de Guilhermy, Monographie de l'eglise royale de S. Denis).

Note 3.p.59. See the work cited by M. Gailhaboud.

There remain to us two beautiful tombs dating from the 12 th century, that represent in flat relief the effigies of the kings Clovis I and Childebert I. These tombs come from the abbey of S. Germain-des-Pres, and are now deposited at S. Denis. The relief of these figures is obtained by a deep cavity left in a thick slab of stone. They had replaced in the church S. Germain-des-Pres much older monuments, but much injured when the abbey was taken by the Normans.

At the end of the 12 th and beginning of the 13 th centuries, were placed in the churches many of these tombs with effigies in low relief. They were very frequently executed in cast or hammered bronze, enameled, and consisted of a plate of metal set with the four corners on very stumpy little columns, on lions or simply on blocks. The tomb of Charles the Bald, placed in the middle of the choir of the religious of S. Denis, was so composed, and its fabrication appears to belong to the first years of the 13 th century. We give a copy of it (Fig. 27) from the drawing in the collection of Gaignieres. The emperor is represented in high relief; his head rests on a cushion, his feet

on a lion. The right hand holds the sceptre with the fleur-de-lis, the left a sphere. He is clothed in three robes, the two lower ones open at the side, and the round mantle fastened on the right shoulder; he wears the crown with cross-flowers. Two little angels are placed in the angles of the trefoil that encloses the head of the prince and hold censers and incense-boxes. At the four angles A of the plate are seated four statues of bishops. An incised inscription forms a border of the tomb. The ground of the slab is entirely enameled blue with fleurs-de-lis and network of gold. Overlaid plates of enamel also decorate the borders of the robe and mantle. Four lions of bronze rest on very short twin columns of stone, and support this slab, (See elevation, Fig. 27 bis), leaving a space of about 1.8 ft. beneath it. [1]

Note 1.p.60. This monument was sent to the foundry in 1793.

We no longer possess in France more than four tombs of metal in the style of that of Charles the Bald. Two are without enamels, and are tombs of bishops of Amiens, Evrard de Fouilloy a and Godefroy; one of these monuments is of great value as art, that of bishop Evrard. The head and draperies are admirably modeled and in an excellent style.

We give (Fig.28) a copy o this tomb. The personage in half round is cast with the plate, and this rests on a very low plinthof stone with six issuing lions. The bishop blesses and b bears the crozier. Two angels in low relief have censers and cense his head, which rests on a rechly decorated cushion. Two clerics are also in low relief and hold torches. The feet of the prelate rest on two dragons. An inscription and a beautiful running ornament surround the figure, with its upper part enclosed by a sort of canopy. The bishop Evrard de Fouilloy was the founder of the existing cathedral of Amiens, commenced in 1220. He died in 1223; then his tomb was formerly placed on the axis at the entrance of the nave, and dates from the first half of the 13 th century. It further possesses all the characteristics of that epoch.

The two other bronce tombs still remaining to us are those of Jean and of Blanche of France, children of S. Louis, before the revolution deposited in the church of the abbey of Royaumont under two niches decorated by paintings. These tombs are very small, and in hammered copper, gilded and engraved, and repres-

representing the two children on two plates of gilded and enameled copper, with rich borders likewise enameled with the arms of France, Castile and Arragon. The young prince places his f feet on a lion, the princes has hers on a grayhound. Angels in half relief bearing censers are fixed beside the head of each, and religious also in half relief are detached from the ground beside the two personages. These two very interesting plaques are now deposited in the church of S. Denis, beside the main altar and opposite the tomb of Dagobert. [1]

Note 1.p.62. One of these is engraved in the Monographie de l'eglise royale de S. Denis by Baron de Guilhermy.

Horizontal tombs of copper, isolated like those of Charles the Bald and of the two bishops of Amiens, precious for the material and the work, as we stated above, were very probably protected on certain days by palls af rich fabrics, and lighted by candles. We have the proof of the last arrangement in the magnificent tombs of golded and enameled copper, to be seen b before 1793 in the church of Villeneuve near Nantes, and drawings of which are preserved to us in the collection of Gaignieres. One of these monuments was erected over the grave of two princesses, Alix, countess of Brittany, who died in 1221, and her daughter Yolande of Brittany, who died in 1272, and dates from the last epoch. The clothing of the countess Alixeven belongs to the years between 1225 and 1235. Was this figure already made then, or did the statuary desire to reproduce the costume of the princess, that died in 1221? We cannot decide the question; still one can admit that the statue of Alix was made after her death, as well as the plate on which it was fixed, (for the enameled ornamentation of that plate is evidently earlier than that of Yolande), and that after the death of the latter the two tombs were enclosed in the same base. However t that may be, on the heraldic borders that enclosed and separated the two tombs were arranged 12 sockets in form of closed f flowers, that were evidently intended to receive candlesticks and candles, as indicated by our Fig. 29. The very low base of the twin tomb is likewise covered by heraldic enamels. At the angles are four issuing lions of gilded bronze. The whole rested on a stone step.

At the angles of this stone plinth one nearly always finds the traces of metal fastenings or of bases of little columns

supporting the iron frame on which was thrown a fabric on anniversaries or on certain occasions. Fig. 29 shows this arrangement.

Nothing equals the splendor of these monuments of gilded and enameled metal. The abbey of Braisne, the cathedrals of Beauvais and of Paris, and the abbey of Royaumont possessed several of them.[1]

Note 1.p.65. See Goignieres, Bodleian Library, and the Monographie de S. Yoed de Braisne, by Stanislas Prioux. (Paris. 1859. Didot edit).

There is a sort of monument intermediate between these last tombs and the horizontal tombs; these are statues lying on a slightly inclined bed, having a small height above the pavement. These tombs were placed in the choirs of churches or in chapels, so as to be seen by the believers and not to obstruct passage. Before the revolution, there existed a tomb so composed in the middle of the choir of the church of Chaloche; it was that of Thibaut, lord of Mothefelon, and his wife Beatrix of Dreux, and their son and daughter-in-law. The four statues reclined on a slightly raised base in form of a camp bed (Fig. 30); the statues were painted; the two lords of Mothefelon wore coats of mail with their arms, which are gules with 6 shields of or placed 3, 2 and 1. This tomb dated from the beginning of the 14 th century.[2]

Note 2.p.65. See Goignieres. Bodleian library.

Engraved horizontal tombs do not date before the 13 th century, as we have already stated. But about the end of the 12 th and the beginning of the 13 th centuries, there were placed in the churches many tombstones flush with the pavement, that presented the effigy of the dead in low relief. The respect of m men for tombs caused the believers not to walk over these stones; but if there was a crowd in the church, it was very difficult to avoid striking against these projections, however small; hence men soon contented themselves with engraving on s stone slabs or bronze plates the entire figure of the dead.

We possess in France a very great number of these horizontal tombs in relief. It will suffice to give here an example of them, found today among those deposited in the nave at the entrance of the church of S. Martin of Laon (Fig. 31). The tomb is of black Belgian stone, and is that of a knight wearing the military costume of the beginning of the 13 th century. His

engravings on tombs, so precious for the study of costumes; th that is why we give no examples here; besides, those objects are outside the domain of architecture.

TOUR. Tower.

In the old fortifications the tower is a work projecting from the curtains and forming a flanking sufficient for the use of guns.

It would be difficult to go back to the first use of the tower as a defense. The tower is known from the highest antiquity; Asians and Greeks, Phoenicians and Etruscans, built towers to fortify the walls of their cities and fortresses. Those towers were generally erected on a square or rectangular plan, and e exceeded the level of the defensive gallery of the curtains.

The Romans had received the tower from the Etruscans and the Greeks, and after the epoch of the kings they flanked the curtains by means of towers with square plans. Around Rome, under the ramparts of the empire, of the late time of the middle ages, are still found numerous traces of those works built of great blocks of peperine by the Tarquins.

Still it is not rare to find Roman towers of a very ancient epoch, of circular plan and flanking the gates. At Arles are still seen on the side opposite the Rhone two bases of towers, that flank the gate, and that date from a very good epoch and are circular in plan. These towers are 26.3 ft. in diameter and are spaced 42.2 ft. apart. The so-called gate of Augustus at Nimes was flanked by two round towers. It was the same at t the gates of Arroux and of S. Andre at Autun (4 th century), at the gate of Vezone (Perigueux), east of the old cathedral. Roman towers on a circular plan and flanking curtains are much rarer; some are seen on the western front of the ramparts of Autun, but which belong to a very late epoch; the same at Rome.

The Romans also erected isolated towers outside the ramparts, a sort of advanced works that protected a weak point, the passage of a river, and commanded the country. Those towers took the place of what we call detached forts; they were sometimes connected by a vallum or earth wall with ditch, either with o other towers or with the walls of the city. The edifice at Autun, to which is given the name of the temple of Janus, appears to have been one of those works, that formed the salient of a

wide bridge-head, of an intrenche camp on the right bank of t the Arroux.

When the frontiers of the empire were menaced, the Roman emperors caused isolated towers to be built to protect the passages and tc support the adjacent peoples. [1] Like the feudal ke keeps later, these towers had no doorways at the level of the ground, but at a certain height, so that one was compelled to use a ladder to enter. [2] The square tower of Autun just mentioned, seems to have had its doorway elevated above the external ground.

Note 1.p.68. (Latin note).Amm. Marc. Book XXVIII. Chap. 2.

Note 2.p.68. Thus were built the Roman towers of Besigheim at the junction of the Necker and the Enz.

Certain Roman towers were merely posts for observation. "An unbroken line of these towers starts from Beuvray and is directed by Vielle Montagne toward the course of the Aron even to Decise by Coucy-la-Tour. The plain of Autun presents a similar line extending along the mountain chain to the northeast between the camps in the valley of the Arroux, above and below the city. It commences at the bend of the Arroux, on the right bank between Mont-Dru and Perriere, and crossing the basin of Autun on the highest points of the plain, ends at the valley of Barnay opposite the camp of the Mountain of Bar, so that none of the towers composing this line ever lose sight of each other. The memory of their beacons is preserved almost everywhere, either by name, or by popular tradition. The name of Vontigny, Mons ignis, Mons Ignitus (mountain fire or burning), has remained in several of those localities." [1]

Note 1.p.69. See Essai sur le systeme defensif des Romains, etc., by M. Bulliot. p. 26.

The column of Trajan shows us in its reliefs many of those towers of observationwith beacons, that permitted the concerting of military operations during the night, and of watching the movements of the enemy or the bands of pillagers during the day. When the government approached its dissolution, the first symptom manifested long before the great final crises is brigandage. The Roman empire in its decline, but long before the moment of its invasion by barbarians, was wasted by brigandage; armed bands were scattered not only on the frontiers of the empire, but around the great centres and even in the Campagna of

Rome. The last emperors were properly occupied in healing that ulcer of the government, that ended without succeeding in this. Constantine, Julian and Valentinian, established in Gaul lines of posts on the borders, along the valleys near the frontiers, and around the grea cities. Those posts were nothing more than towers erected on ridges, natural or artificial hills. We shall soon see that this Roman system was long observed during the m middle ages.

It is then proper first to distinguish the flanking towers, i.e., those attached to the curtains of a place, from isolated towers.

Vitruvius explains how flanking towers should be established; "they must," says he, [2] "project from the external face of the wall in such manner, that when the enemy approaches (the curtain), he will be taken in flank by two towers, one at the right and the other at the left. The walls of fortresses must be placed, not on a square plan presenting salient angles, but according to a circular perimeter (or approaching that figure), so that the enemy can be seen from several points, for salients a are defended with difficulty, and are more favorable to the besieger than the besieged. The interval between the towers must be calculated according to the range of an arrow, so that the besieger may be repulsed by the casting machines operating on both flanks."

Note 2.p.69. Vitruvius. Book I. Chap. 5.

"It is necessary at the towers, for the curtains to be interrupted by a space having a width equal to the diameter of the tower. So that the defensive galleries being interrupted are only connected by carpentry foot bridges, that are not fixed by iron cramps and can be cast down, if the enemy has no possession of a part of a curtain, thus rendering impossible the occupation of other curtains and towers."

"Towers must be built on circular or polygonal plans, for if square, battering rams destroy them more easily by ruining the angles. If circular, each stone forms a wedge and transfers the shock to the centre, so that these towers better resist t the effort of the machines. But nothing equals the terracing of the ramparts of towers to give them a greater power to resist."

These principles are the same that are accepted in our days, excepting modifications caused by the range of modern engines.

To see the enemy from several points, consequently to avoid s salients flanked with difficulty; always to place the assailants under convergent fire; to arrange so that if a work be taken, this does not lead at once to the abandonment of others; to rely on the need of separating the works, such are the unchangeable principles of fortification. So far as we know, they were established by the Greeks and Romans, practised during t the middle ages with marked superiority, singularly developed in modern times by reason of the use of cannon. In fact, from the round tower with short flanking and always having dead points, to the modern bastion with its flanks and fronts, there is a long series of experiments, trials and changes. [1]

Note 1.p.70. See La fortification deduite de son histoire, by Gen. Tripier. Paris. 1866.

The Roman tower on a circular or square plan (for whatever Vitruvius taught, the Greeks and Romans erected many square flanking towers), was open or closed at the back, i.e., at the inside of the fortress. If open, the defensive gallery of the adjacent curtains was interrupted at that opening as Vitruvius indicates. If closed, the galleries on the curtains required two doors to be opened for entering or leaving the tower, to t take the other curtains. In that case the tower formed an obstacle to the continuous passage at the level of the top of t the ramparts. The first of these are retrenched towers, properly speaking, while the second are posts or little separate forts, commanding the ramparts.

What proves that this system of retrenched towers was by preference practised by the Romans, is that we see during the middle ages the use of this system persists in the cities, that have best preserved Roman traditions; while in the North, where Norman influence early makes itself felt in the art of fortification, towers are always closed, unless however they flank an external enclosure commanded by an in ernal enclosure.

We shall then divide this Article into:- Flanking towers, open or closed at the back; Fort towers, replacing or dependent on keeps; Watch towers; Isolated towers; Posts, signal towers, t towers at passes or bridges; Lighthouses.

TOURS FLANQUANTES. Flanking Towers.

Flanking towers established according to Roman tradition, that continued in the West until the epoch of the great Norman

invasions, (at least when not dependent on gates), are generally solid to a certain height above the top of the ditch or the external ground, so as to resist the efforts of the attacking machines or of the sap; their flanking then commences only at the level of the defensive galleries of the curtains, and consists in quite wide openings masked by movable mantlets of wood. This first flanking is surmounted by the upper crenelated story forming the crown and the second flanking. This upper story is covered by a roof, so as to shelter the battlements, or if uncovered, the roof is then placed behind the defensive gallery or flush with it.

Here (Fig. 1) is a type of those towers of the end of the Roman empire, [1] open at the rear, but interrupting the defensive galleries of the curtains.

Note 1.p.71. Visigothic towers of Carcassonne; towers of Autun, Cologne and Dax; towers of Rome of the time of Belisarius.

Platforms laid on the engaged beam A allow the passage from one defensive gallery to another, and to enter the second story of the tower on a level. This first story is placed in communication with the third and with the battlements by wooden ladders. A movable ladder is raised by a windlass and connects the floor of the second story with the ground of the internal military road. This part of the ladder being raised and the platforms removed, the post guarding the tower could not fear a surprese; it is entirely isolated. Meanwhile it sees what passes in the city and can be watched. When the tower is occupied by the enemy, it cannot fight the military road, since the stories of that are open to the road. The supply of projectiles is obtained by these openings on the military road, as our Fig. indicates.

The tower is externally defended by openings made in the two stories and by the upper battlements. The wide embrasures in arched form are masked by movable wooden mantlets and swing on an axis.

The city of Carcassonne still possesses towers dating from the rule of the Visigoths, constructed on this principle, except that the defensive gallery passes through the tower, that is pierced by doors at the level of the defensive gallery. At Carcassonne the Visigothic towers have covered battlements, mantlets for the upper openings as for the openings in the sto-

stories, and wooden galleries to allow men to reach the foot of the defenses.

Here (Fig. 2) is the plan of one of these towers, [1] at the level of the defensive gallery. Below this level, the work is solid masonry.

Note 1.p.73. The tower called of Four S. Nazaire.

Fig. 3 shows the side of this tower with the section of the defensive galleries of the curtains. At A is sketched in place a frame of the defensive gallery; [2] at B is the perspective detail of one of the corbels of the upper battlements intended to receive the axes of the mantlets, and at C are the projecting stones set below the arched openings to also support the axes, that permit raising or lowering the shutters closing these arches. Above the floor placed at D is opened toward the city an arch, that allows seeing what passes in the upper story, and facilitates the supplying of projectiles. This arch surmounts the closing wall C (see plan), and rests on the two piers E, I.

Note 2.p.73. Article Hourd.

The question of the rapid supply of projectiles intended for defending these towers does not seem to have been examined with sufficient attention. One will note that these towers of an e early epoch, i.e., that date from the end of the Roman empire till the last Carlovingians, are generally of small diameter, and consequently could not contain a very large supply of projectiles, whether arrows or stones suitable to be thrown upon the assailants, that desired to approach the foot of the works and mine them.

Assuming that a tower, like that presented here (Figs. 2, 3), be attacked at its foot; that miners protected by cats attack the masonry; the defenders can only repulse this attack by casting on the cats from the defensive galleries large stones or burning materials to destroy them. If the attack be prolonged, one can estimate the considerable quantity of projectiles necessary to have at hand. It was then essential to renew constantly, as today it is to renew without ceasing the munitions of cannon placed on the works, that contributed to the defense of a point attacked.

These towers open at the back lent themselves to continual supplies, for their diameter being small, it was the more necessary to replace frequently the projectiles employed for the de-

defense. Besides the attack not being serious, except when very close, the point attacked defended itself without awaiting assistance from the adjacent works. All the efforts of the attack, and consequently of the defense, being thus limited to a very narrow area, the means of defense accumulated at the point attacked, and must be renewed with activity and facility. We shall see how this method of defense was gradually modified according to the improvements made in the mode of attack.

There is another observation to be taken into account. In the works of the end of the Roman empire, as during the Greek and Roman periods, the towers have a considerable command over the curtains (Fig. 4); [1] this arrangement is very regularly observed until about the middle of the 13 th century, but then the curtains rise higher; the command of the towers over the curtains diminishes accordingly. At that epoch it even sometimes occurs that these towers do not fulfil the function of flanking, and on longer command the curtains. It is again the system of attack that causes these changes. We shall have occasion to return to this subject.

Note 1.p.75. Gallo-Roman mosaic, museum of Carpentras.

By examining the angle towers of the castle of Carcassonne, whose construction dates in the first years of the 12 th century, one can take an accurate account of the means of supplying the upper defenses of these towers, for the works are perfectly preserved, the old carpentry alone being omitted.

Fig. 5 presents the plan of the northeast angle tower, called of the Major, at the level of the ground of the court of the castle. The round hall has a hemispherical vault, and is defended by 5 slots that strike the bottom of the ditch. Fig. 6 gives the plan of the second story, at the level of the defensive gallery of the curtains. The slots that open from the hall to the number of four, are not pierced above those of the great story, so as to leave as few dead points as possible. The vault covering this second hall is likewise spherical, and is pierced by a hole A or sound opening, that communicates with the upper stories. The third story is not vaulted but is covered by a floor placed behind the defensive gallery of the t tower. This third hall was only destined for the lodging of t the post in the tower, and was not defended. Above rises the battlements with the defensive gallery and a wooden gallery.

(Fig. 7). To facilitate placing the carpentry of the roof, the interio r of the battlements is polygonal. The roof thus being pyramidal with framing that forms the transition between the p pyramid of the cone. From B to C are assumed to be set the frames of the wooden galleries. These evidently projected very st strongly, for the two superposed holes left in the construction to receive the trusses, indicate a system of ties with struts relieving the overhang of the horizontal timbers intended to carry the floor. The section on the line a b of the plan of the ground story (Fig. 8) shows the arrangement of the two lower halls pierced by slots, of the hall D, the chamber of the guard, and of the upper story, the post of the captain of the principal defense. The crane E vertically over the court of the castle allowed the hoisting of munitions to the top of the defenses, without its being necessary to carry them up the stairs on men's backs. By means of a windlass placed at G and a pulley at E passing through the tiebeam of the principal truss of the roof, a very considerable weight could easily be raised. Our section (Fig. 8) indicates this very simple mechanism. The bucket being hoisted above the level of the floor of the gallery, the trap was closed, the windlass released, and the munitions were placed along the wooden gallery or in the upper hall; for one will note that this hall is in communication with the wooden defensive gallery by the openings.

Note 1.p.78. Article Hourd, Fig. 1.

This hall being well furnished with stones and the galleries with arrows and tiles, it was possible to cover the assailants with projectiles for several hours. The machicolations of the galleries also projected and were usually double, i.e., allowed stones to fall at I and L. Materials falliug from I bounced on the slope K and struck the assailants obliquely. (Art. Machicoulis).

Fig. 9 clearly explains, we believe, the mode of hoisting m munitions. The man waits until the bucket is hoisted to the level of the floor before closing the trap and placing the projectiles where needed. At A is traced the horizontal section of the little double posts at the angles of the gallery, leaving between them a space for the planks covering the gallery. The floor of the upper hall being 4.2 ft. below the sills of the openings of the battlements, allowed the storing of a consider-

considerable quantity of projectiles, that the men posted in t that hall passed as needed by the defenders of the gallery, so as not to encumber the defensive gallery. Even during an attack, men could hoist by the windlass caustic lime, boiling pitch, ashes, that blinded the assailants. [2] (Art. Siege). One will note that this angle tower, like all those of the defenses of the citw of Carcassonne, interrupts the passage on the defensive gallery of the curtains, and thus compels the recognition of the patrols at each turn. Besides, in these towers lodged the posts for defense, and each of these posts had to defend a portion of the curtain. The tactics of the assailants c consisted in taking possession of a curtain in spite of the f flanking, aud thus passeng into the place.

Note 2.p.78. As for melted lead and boiling oil, those means of defense were a little too costly to be taken seriously. Besides the melted lead falling from that height would arrive in cooled drops, which would not be feared much. It was only exceptionally that men had recourse to this means of defense. Simple boulders with a weight of 17.6 to 22.0 lbs. f.lling from a height of 65.6 ft. were the projectiles to armed men with armor.

Then the posts in the towers shut themselves within, and it was necessary to besiege them separately, which made possible an offensive by the garrison, that placed the besiegers in a very dangerous position. Yet from the middle of the 13 th century, it was desired to connect more the parts of the defense, and the height of the curtains was increased, thus renouncing the important command by the towers. In the last example that we present, the level of the defensive galleries of the curtains is at N; the command of the tower is thus very pronounced.

This command is already less considerable at the castle of Coucy, built about 1220. [1] The four corner towers of that castle are very remarkable, from the twofold point of view of construction and of defense. They are solid for the entire height of the slope. Five stories rise above this slope; two are vaulted, two are closed by floors, and the fifth is covered by a conical roof. [2]

Note 1.p.81. It is well understood that there is no question of the structure of the [illegible]

Enguerrand. The curtains of the castle of Coucy were raised h higher about 1400 by Louis of Orleans.

Note 2.p.81. For the system of construction of these towers, see Art. Construction, Fig. 144.

The plans (Fig. 10) present at A the northwest angle tower, at the level of the floor of the second story of the castle; at C at the level of the third story, at D at the level of the upper battlements.

The lower story is vaulted at the level of the ground of the court and has no slots; it is a cellar fro provisions, whose vault is pierced by an opening. The stairs only ascend from the level of the court to the floor of the fifth story, and t the story of the battlements is only reached by a wooden stairs (miller's ladder). [3] At g are fireplaces and at l are privies. An opening left at the centre of the floors permits hoisting munitions from the ground story to the top of the tower on the defensive gallery. The slots alternate so as to prevent possible dead points. [4]

Note 3.p.81. These stairs were extended to the level of the roofs under Louis of Orleans.

Note 4.p.81. Art. Latrines, Fig. 1.

The towers of the castle of Coucy present an interesting peculiarity, which is the transition from the wooden defensive gallery to the machicolations of stone. [5] Stone corbels replace the holes through which were passed the projecting timbers (as we have seen in the preceding example), that received the outer defensive galleries established in time of war. These permanent corbels then received the defensive galleries. [6]

Note 5.p.81. Arts. Donjon, Hourd, Machicoulis.

Note 6.p.81. Arts. Hourd, Porte (the gate Laon at Coucy-le-Chateau.

Fig. 11 gives the section (on the line a d of the plan 7) of this beautiful work. Besides the openings of the slots, the h halls of the fourth and fifth stories have a window in each, that lights them. Munitions were hoisted by a windlass placed in the hall of the fifth story, as shown by our Fig., and were deposited on the upper floor in communication with the wooden defensive galleries by means of covered openings. The defensive galleries sketched at C explain the system of wooden defenses set in time of war on the permanent stone corbels Σ. The level of the defensive galleries of the curtains being at P, it is seen that the command of the tower over this gallery

was already less important than in the preceding example.[1] At E commences the wooden stairs that passes across an arch of t the hexagon and ascends from the fifth story to the level of the upper floor, very solidly built to receive the weight of a supply of projectiles.

Note 1.p.84. The upper part of the battlements is now destroyed, but is restored by the aid of engravings by Du Cerceau o and by Chatillon.

This structure is marvellously executed in courses of 1.3 to 1.6 ft., and has suffered no alteration, in spite of the alteration of the pieces. The external slope descends to 26.3 ft. below the level K of the ground of the court. An external elevation taken from B (see plan), Fig. 12, completes our description. The wooden defensive galleries are placed on half the cor-corbels.

These defenses of the castle of Goucy are constructed at the top of a precipice; their effect consequently could be exerted only on a very short radius, when the assailant sought to lodge himself at the very feet of the towers.

Slots are pierced in each story, rather to take into account the movements of the enemy than for shooting. It was here necessary to oppose to attacks an obstacle, formidable by its elevation and by the defense at the top. In fact in three sides, the castle of Coucy leaves between its walls anf the crest of the hill only a width of some yards, an external passage that could itself be defended. A very broad ditch and the great keep protect the fourth side.[2] There was only a near and almost vertical defense. But the situation of the place often required then as today, to supplement the natural obstacle of a precipice by a range of fire as extended as possible horizontally, so as to annoy the approaches. This condition is habitually f fulfilled by low works, external flanking enclosures, dominated by the command by internal works. The very complete enclosure of Carcassonne in that respect furnishes us with arrangements of great interest. It is known that the city of Carcassonne is protected by a double wall; the external one has an unimportant command; on the contrary, the inner one dominates that external enclosure and the country.[3] Now the external enclosure was b built about the middle of the 13 th century by the order of S. Louis, and is flanked by towers, mostly closed at the rear and

spaced from 164 to 197 ft. apart. Those towers have but little command over the curtains, and sometimes are even united with them, are arranged for distant defense. Well equipped with slots, they project beyond the walls and receive projecting defensive galleries.

Note 2.p.84. Art. Chateau.

Note 3.p.84. Arts. Architecture Militaire, Fig. 11; Siege, Fig. 2.

One of those towers is entirely preserved and presents an arrangement conforming in all points to what we have just indicated. Fig. 13 gives the plan of this tower at the level of the ground of the lists, i.e., the military road made between the two enclosures. Fig. 14 gives the plan of the second story. The defensive gallery of the curtain is at A, and the tower d does not interrupt the passage.

Note 1.p.86. Tower called la Peyre, at the left of the barbican of the gate Narbonne.

The door B connects the defensive gallery with the ground s story by the stairs D, with the second story on a level, and with the upper defenses by the stairs E. The numerous slots are alternated to avoid dead points. Fig. 15 presents the plan of these upper defenses, the wooden gallery being assumed as placed at F. The battlements are widely opened at G to allow supplies and so that the work cannot be defended against the inner wall, that further possesses a very important command. In teme of peace, the circular space H alone was covered by a permanent roof. The roofs of the defensive galleries placed in time of w war covered the inner and outer defensive galleries K and L; a wide hood protected the opening G. The section made on the line a b of this plan is presented in Fig. 16. At V is sketched the profile of this entire work with the ditch, the crest of the counterscarp and the ground forming the glacis. One sees how the slots are arranged to cover this glacis with sweeping projectiles, and the crest and foot of the counterscarp with plunging projectiles. As for close defense, it is provided by the machicolations of the defensive galleries, as one sees at P. Fig. 17 gives the elevation of this tower from the inside, the defensive gallery being placed only on the side R.

If the assailants succeeded in obtaining possession of this work, they found themselves at 66 ft. from the foot of the in-

inner wall, whose towers were closer but projected less from t the curtains, presenting a front with many short flankings. F From the top of that inne enclosure, whose height is 49.2 ft. above the covered way S, it was not difficult to set fire to the roofs of the towers of the outer enclosure by means of incendiary projectiles, and thus make its occupation impossible, the more as these towers did not defend themselves from the military road of the lists.

With the casting machines anf the means of attack of that epoch, one could not adopt a better defensive combination. Thus the towers were solid bor the height of the slope covering the natural rock, and could not be ruined by mining. Well pierced by slots, they cast divergent projectiles directly to 200 ft. from their circumference. To attack them, it was then necessary to undertake a series of works, that required time and many men; while to defend them sufficed a less numerous post. A work of this extent could long defy attacks with a capitain and 20 men. [1] If the attack were very close, the lower slots became u useless, and then the 20 men distributed on the wooden galleries covered the assailants with a storm of projections. We h have stated elsewhere (Art. Architecture Militaire) that the besiegers rather directed their systematic attacks against the curtains, than against the towers, because the curtain possessed less means of defense than the towers, and that it was more difficult for the besieged to fortify them. But it is unnecessary to say, that to take a curtain, it was first essential to destroy or mask the flankings by the adjacent towers.

Note 1.p.89. Eight crossbow men in the two tower stories easily serve 16 slots. 8 men.

One attendant in each story	2 men.
Eight crossbow men in the galleries	8 men.
Two attendants for the machicolations	2 men.
A captain of the tower	1 man.
Total	21 men.

The external walls of Carcassonne have 14 towers; assuming each to be guarded by an average of 20 men, making	280 men.
Twenty men in each of the three barbicans	60 men.
One hundred men to serve the curtains at the points of attack	100 men.
The external walls comprise 24 towers averaging 20 men each	480 men.

For gate Narbonne	50 men.
To guard the curtains	100 men.
For garrison of the castle	200 men.
Adding a captain for each post and tower, according to custom	———
We obtain a total	1320 men.

This number is more than sufficient, since the two walls do not have to be defended simultaneously, and the guard in the inner enclosure could send detachments to defend the external enclosure, or if that had fallen into the power of the enemy, its defenders would take refuge behind the inner enclosure. Besides the besiegers would not attack all parts at the same time. The perimeter of the external enclosure being 4593 ft. inside the ditches, then about one man to 3.3 ft. of length must be counted to form the garrison of a city fortified like the city of Carcassonne.

While the towers enfiladed the curtains, men could scarcely bring the cats and rolling towers agains these curtains. Thus although it did not conform to tactics to send an assaulting column against a tower, -- and the rolling towers were only a means of throwing an assaulting column on the curtain, -- it was always necessary for the assailants to nullify the defenses of the towers on the flanks, before undertaking anything against the curtain.

But admitting that the wooden galleries of the towers had been destroyed or burned, and that their defenses had been reduced to the slots of the lower stories, that the rolling towers were near the curtain; the defensive gallery of the curtain was always elevated above the ground inside, and the assailants throwing themselves from the rolling tower on those defensive galleries were taken in flank by the defenders, who sallied from the adjoining towers as from forts, at the moment of assault, as a provision for this occurrence, although the towers intercepted communications between one defensive gallery and another, these towers had doors opening directly on these defensive galleries, permitting the posts in the towers to throw themselves on the flanks of the assaulting column.

Here (Fig. 18) is one of the towers of the external wall of Carcassonne, built by S. Louis, which exactly fulfils this programme. This is the tower on the north front, called the Port-

Rouge (Red gate). This tower has two stories below the battlements. As the ground rises sensibly from a to b, the two defensive galleries of the curtains are not on the same level; the gallery b is 9.8 ft. above the gallery a. At A is traced the p plan of the terrace; at B on the level of the gallery d; at C on the level of the battlements of the tower, that sweeps the battlements of the curtains e. One sees at d the door that descends to the lower story A, and at e is the door that opens on the higher defensive gallery, communicating to the second stairs descending to the story B. One passes outside the battlements of the tower by the stairs g. Further the two stories A a and B are connected together by an internal stairs h h', made in the thickness of the wall of the tower. Thus the men were posted in the two stories A and were alone in direct communication with the two defensive galleries. If the besiegers have succeeded in destroying the wooden galleries and the upper battlements, and if they believe that they have rendered the work indefensible, and they attempt to assault the curtains, they a are received in flank by the posts established in the lower stories, which being easily masked, could not be overthrown by projectiles from the stone-throwers, or made uninhabitable by burning the roof of wooden galleries. A longitudinal section made of the two defensive galleries from e to d shows that arrangement (Fig. 19). It is seen that e' is the door of the stairs e, and d' that of the stairs d (of the plan). The last d door is defended by a watchtower f, reached by a flight of 6 steps. At h" commences the stairs which connects the two stories A .nd B. A layer of earth placed at K prevents fire, which could be set to the wooden gallery and the roof by the besieged, from communicating to the two floors that cover these two stories A and B.

Fig. 20 gives the section of that tower on an axis perpendicular to the front. At d" is the door opening on the stairs d. The wooden galleries are placed at m. At p is sketched the profile of the precipice with the extension of the lines of fire from the two rows of slots of the stories A and B.

It is unnecessary to state that the wooden galleries sweep the foot o of the tower.

A perspective view (Fig. 21), taken from the military road b between these two enclosures (point X of the plan), will illus-

illustrate the internal arrangements of this defense. Supplies for the wooden galleries and the defensive galleries of the to tower are made by opening c (of the plan C), by means of a hoist and pulley, as shown by the perspective sketch.

Here the tower commands only one od the defensive galleries (section, Fig. 19). At its construction under S. Louis, it commanded both defensive galleries; but under Philip the Bold when the defenses of the city of Carcassonne were terminated, the heights of some curtains were increased, which do not seem to have been commanded by a sufficient height. At that epoch the battlements G were placed above the old battlements H without taking the trouble to demolish the latter, so that externally these first battlements H remain enclosed in the raised masonry. In fact, the external ground rises like the military road from a to b (see plan), and the engineers believing that they should adopt a uniform command of the external curtains, both for the outer and the inner walls, all these heights were made regular at about 1285. It must also be stated, It must also be stated, that at this epoch they rarely gave to the towers ay important command except at the angles of fortresses, or at some places where it was necessary to observe the exterior.

For the great fronts, the flanking towers do not command the curtains, and this arrangement is observed for the great south front of the internal wall of Carcassonne, rebuilt under Philip the Bold.

The city of Carcassonne is an inexhaustible mine of information on the art of fortification from the 12 th to the 14 th centuries. There are not found scattered fragments much altered by time and the hand of man, but an entirety coordinated with system, nearly intact, constructed of strong materials by the rkilful engineers of the 12 th and 13 th centuries, as being a military point of very great importance. When Carcassonne was compressed in the royal domain under S. Louis, that place at a point distant and badly connected with the possessions of the crown, became a bridge-head protecting a notable part of Languedoc against Arragon.

All the defensive arrangements still found in France and dating from this epoch, have not the unity of conception and the value of the fortifications of Carcassonne. Hence it will be understood why we have chosen by preference our examples in

that place of war, that happily today by the efforts of the government and the enterest that the people of Carcassonne took in that fortress, unique in Europe, is preserved from the ruin t that so long menaced it.

The arrangement of the last tower of the external enclosure just given by us is such, that this work could not defend itself against the inner wall; for not only is that tower dominated by far, but is nothing of a defense inside.

All the works of this outer enclosure are in the same situation, although much varied in their arrangement by reason of t the nature of the ground outside, and the needs to be satisfied. There is only one point where the external wall is connected to the internal defense by means of a tower built across the military road, which separates the two fronts. This is a work on a rectangular plan, placed as a watch-tower, flanging at once the external curtains and the lists (military road) and the internal curtains; allowing one to see, without leaving the inner defense, the ascent at the gate from the Aude, all the front as far as the western salient of the place defended by two great angle towers, and the part nearest the suburb of the barbican. This tower, called that of the bishop because it overlooks the episcopal palace, is an admirable work, built of beautiful hard sandstone with bosses, and belonging to the works completed u under Philip the Bold.

Note 1.p.95. See the general plan of the city of Carcassonne, Art. Architecture Militaire, and the Archives of the monuments historiques.

Here are the plans of the different stories (Fig. 22). At A on the level o the lists or military road between the two walls, the battlements of the external enclosure being at a and the curtain of the inner enclosure at b. -- The second story is traced at B. From the terrace of the city, this story is reached by the stairs d, which ascends to the two upper stories. The plan C gives the story of the battlements with its f front wood gallery e. The defensive gallery g connects with the gallery h by passing through the door i, and ascending several steps to reach the level of the hall k and descending again by the screw stairs. Two machicolations at m and n (see plan C) command the two branches across the military road.

Fig. 23 gives the section of this work made on the line o p.

The level of the lists is at A, the level of the ground inside the city being at B. Besides the two machicolations pierced in the archivolts of the passages P, in time of war wooden galleries were established on the third story above those arches, as indicated by the sketch D and the profile d; galleries to which the openings C gave access. A wooden gallery placed at E on t the front of the tower commanded its foot and flanked its angles. The profile F gives the section on the internal curtain, the lists and the external curtain. All stories are connected by openings pierced at the middle of the cross vaults. These openings permit supplying the upper stories with the munitions necessary for serving the galleries.

Fig. 24 presents the perspective view of this tower outside the external enclosure with the wooden galleries placed everywhere. It is seen that the slots of the battlements have their field of fire below the galleries, which permits two lines of crossbou men or archers to defend the works, since the galleries have slots above the machicolations. The corner turrets are octagonal, afford a divergent fire, and are flanked by the slots in the sides of the galleries. This tower has the advantage of enfilading the military road between the two enclosures, of cutting it off entirely at need, and of possessing flankings of t the scarp and of the external enclosure. Perfectly preserved, built of unchangeable materials, it could be utilized by means of works of small importance.

All the works undertaken at Carcassonne under Philip the Bold have a remarkable character of strength, and indicate profound knowledge of the art of fortification, having regard to the m means of attack of the epoch. The flankings being near, it is impossible to combine them better. The garrisons were then composed of men of all sorts, lieges and mercenary, and it was necessary to mistrust possible treasons. These towers were independent forts, intercepting passage along the defensive galleries and even on the lists, as seen in the preceding example. Each being commanded by a captain, the surrender of one did not lead to the fall of the others. The citizens could not ascend to the defensive galleries, which had a considerable height a above the terrace, and only communicated with the ground inside by very rare stairs generally passing through posts. Every attempt at treason became difficult and doubtful, because it

was necessary, either to take many persons into confidence in the means to be employed, or that it should remain isolated, therefore being promptly suppressed.

Sometimes the defensive gallery of the curtain extends around the flanking work and contains a post; but then the tower has all the character of a fort or little keep possessing its means of defense, for effensive return and retreat, being independent. Several towers of the internal walls of the city of Carcassonne are conceived on this system. One of them, the so-called tower S. Martin, is well preserved and clearly explains this arrangement to us.

Built on the south front near the postern of S. Nicaise, the tower S. Martin rises 82.0 ft. above the military road of the lists and 50.9 ft. above the ground in the city. It has two lower vaulted stories, and two upper stories below the roof with an intermediate floor at the level of the wooden galleries. Fig. 25 gives at A the superposed plans of the two lower stories, a and at B the superposed plans of the two upper stories. Examining these plans with some care, one observes that the cylinder of masonry is thicker on the outside than towards the interior of the city; in other words, that the circle of the interior is not concentric with the exterior of the tower; that this external front is reinforced by a spur or projecting beak G. This spur and the greater thickness given to the masonry result in neutralizing the effects of the battering ram, and place the a sailants under the direct fire from the adjacent flankings. (Arts. Architecture Militaire; Porte). One enters the tower from the city by the door P, and the straight stairs ascending to the second story. From this second story, by the screw stairs one descends to the lower story and ascends to the upper stories.

The battlement story, and that can be equipped with wooden galleries, is in communication with the defensive gallery and the curtains by the two doors K and L. This gallery extends ar around the upper story on the side next the city at G. A section made on a b (Fig. 26) permits easy understanding of these arrangements. The story H contains a fireplace and is lighted by a window F looking on the city. Wooden galleries were placed at I according to custom. The slots of the two lower halls alternate as indicated by the plan. [1]

Note 1.p.101. The slots of the ground story are hatched, like the door leading from that story to the screw stairs.

This work and the preceding belong to the structures of Philip the Bold, and consequently date from the last years of the 13 th century.

Sometimes at that epoch to extend the flankings of the towers, there is given to them in plan the form of a pointed arch. [2] On this plan are built some of the towers of Loches.

Note 2.p.101. Art. Architecture Militaire, Fig. 24 bis.

The great machines for attack were then perfected; there were opposed to them walls built solid without stone, thick merlons, defensive galleries built of great timbers; several vaulted stories were arranged to protect the posts from projectiles thrown in a curve. They sometimes returned to the square tower as having longer flanks and fronts, that were protected by strongly projecting wooden galleries, and soon by stone machicolations.

The towers of Aigues-mortes were built by Philip the Bold and are rectangular in plan; the same plan was adopted for the greater part of the towers of the walls of Avignon. It must be st stated that an entire front of these ramparts was arranged under Pope Innocent VI by Jean Fernandez Heredia, commander of M Malta, and that the arrangements then adopted wer successively followed from 1350 to 1364. [3] Most of these towers project very far from the curtain, whose defensive gallery passes behind t them or is interrupted by the sides. Further, these towers are generally open at the rear.

Note 3.p.101. Most of the military works of the orders of t the Temple and of Malta present square towers. (See Essai sur La domo franc. en Syrie pend. le moyen age, by E. G. Rey. 1866.

Fig. 27 presents the plan of one of those towers of Avignon in the ground story. A stairs F, closed by a door, permits one to ascend to the second story, (Fig. 28), which communicates by two exits with the defensive gallery of the adjacent curtains G and H. A second corbelled stairs ascends to the upper story with battlements (Fig. 29), pierced by machicolations. As one can see, this tower is only defended from its top. The perspective view (Fig. 30) taken from the city side, completely explains the system of defense, and indicates the means of access to the two stories. Open at the rear, it cannot be regarded as an independent fort at need; yet the defensive galleries of the

curtains are interrupted like the Roman towers mentioned by V Vitruvius. Its external area permits assembling on its top a very great number of defenders. If the assailants succeed in undermining its front at K (Fig. 27), it would still be possible to defend the breach, either by fortifying the rear front, or by overwhelming the enemy by dropping projectiles through the great machicolations opened in the middle of the floor of the second story. We have assumed the roof to be removed, so as to show better the system of defense, but it was placed over the upper space and sheltered the floor of the second story and the ground of the ground story.

Already at the middle of the 14 th century men began to make use of cannon. However those cannon had but a small calibre a and mediocre range, and could not produce a serious effect on masonry, even if rather thin.

The old great siege engines, stone-throwers, mangonels and t trebuchets, casting stone balls weighing 220.5 or 330.7 lbs and sometimes more, in a parabola, were more formidable than the first pieces of artillery. The projectiles cast by those great machines could only produce an effect when they passed above the defenses and fell, either on the roofs of towers or within the places. Du Guesclin, although he did not make very much use of these war machines, and preferred to make a sudden attack, sometimes employed them, and when he placed them in battery before a fortress, this was always to demoralize the garrison by the quantity of projectiles by which he covered the streets and houses.[1]

Note 1.p.104. "And (du Guesclin) went his way and his return, and all the lords of France in his company, to come again before the city of Usson in Auvergne, and besieged it; and there the duke of Berry, the duke of Bourbon and the constable caused to be brought and hauled great engines from Riom and from Clermont, and placed before the said fortress, and with all that to arrange great preparations for assault." (Froissart. Chron. 329).

If the defenses were very high, the projectiles could only strike their surfaces directly, and could not injure them.[2] The troubadour Cuvelier in the Life of Bertrand du Guesclin relates, how at the siege of the castle of Valogues, at each stone cast by the engines of the besiegers, a man of the guards wiped the stones with a white napkin in derision. He also takes

care to tell us in the same passage, how the garrison covered the terraces with manure to prevent the effect of projectiles thrown in a curve.(Old French poem).

Note 2.p.104. Old French poem. (La Vie vaillant . Bertran du Guesclin, by Cuvelier, troubadour of the 14 th century. Verse 5076 et seq.).

The great power then given to the machines compelled the military architects to increase the heights of towers and curtains. But if necessary for a place covering a great area, these curtains could not be given a very great height without considerable expense; thus under Charles V new arrangements were made. Until then men had but exceptionally thought of terminating t towers by platforms suited to receive machines. These machines were placed in position on platforms of wood constructed inside along the curtains, or even on the ground behind them, when they had but a small height, or again along the lists, when the places had double walls, so as to keep off assailants. But when the first wall was taken, there was no longer anything but a very near defense, and then the casting machines became useless, and the wooden galleries or the machicolations sufficed.

Under Charles V, let us say, men modified the old defensive arrangement. They already possessed small guns, which permitted lengthening the fronts, and consequently making the flankings more distant. Men had recognized that short fronts had the inconvenience, if the two adjoining flanks had been destroyed, of concentrating the assailants and presenting only an obstacle of small length, against which they could accumulate his means of attack. Thus it was always against these short curtains between two towers, that the last operations of a siege were concentrated, as soon as had been previously ruined the upper defenses of the towers by fire, if they consisted of wooden galleries, or by great projectiles, if those galleries and machicolations were faced with masonry. About 1360, the curtains were made longer; the towers were spaced farther apart and occupied a greater area, sometimes had straight flanks, i.e., these towers were built on a rectangular plan, and were crowned by platforms. The castle of Vincennes is a fortress type conformed to the new arrangement. The well known plan of the place [1] presents a great parallelogram flanked by four rectangular towers at the angles, of one (gate) tower also rectangular and at the

middle of each end, of three square towers on one long side, a and by the keep with its enclosure on the other.

Note 1.p.108. Art. Architecture Militaire, Fig. 41.

The curtains are 328 ft. long, which exceeds the limit of the old flanked walls.

The angle towers are so placed that their flanks are longer at the ends of the parallellogram than at the sides, so as to better protect the gates.

Here at A (Fig. 31) is the plan of one of those angle towers in the ground story, i.e., at the level of the ground of the place. Great buttresses resting on a slope rise to the upper cornice, which is merely a series of wide machicolations. The three stories were vaulted, and on the last vault rested a stone slab platform, very suitable to receive either great machines or cannon. A parapet protects the crossbow men. At B is t traced the plan of this platform.

Fig. 32 gives the elevation of this tower on its longer side with the adjacent curtain. One recognizes here that about the second half of the 14 th century men returned to a considerable command of towers over the curtains, with the evident intention to utilize that command for placing machines of long range. The upfer vault was covered by a thick layer of stone dust [1] under the stone slabs, and resisted all projectiles thrown in a curve, assuming that these projectiles could rise sufficiently high to fall on the platform.

Note 1.p.108. This "cran" is the dust produced in stonecutting, and that is gathered on the yard. It was much used during the middle ages to cover vaults, that it was desired to protect from projectiles or fire.

The tower only defended itself entirely from the top, either by fixed machines, or against close attack by battlements and machicolations.[1]

Note 1.p.109. These towers were razed to the tops of the curtains in 1814. (See the large engravings of Israel Sylvestre, Les plus excellens bastiments de France, etc).

It is curious to follow step by step from antiquity this constant movement of oscillation, that in works of defense sometimes causes men to give to towers or flankings a command over the curtains, and sometimes reduces this command and razes the tops of towers to the level of the curtains. Again in our days

these oscillations make themselves feltin the art of fortification, and Vauban himself at about the end of his career had r returned to commands elevated on bastions, after having recommended flankings on a level with the curtains.

In fact, whatever the range of projectiles, that is only a r relative question, since the conditions of fire are equal for the besieged as for the assailants. If the elevated commands are suppressed, the assailants are exposed at a smaller distance, and they are permitted to commence near their works of approach; if one increases this command, greater facility is given to the artillery of the besiegers. Thus we see during t the middle ages and principally since the adoption of cannon, that the systems succeed each other and vary between the two principles.[2] Besides a difficulty arose formerly as it rises today.

Note 2.p.102. In our time we have seen german fortification return to elevated commands, to towers with bastions.

The trace of a place in horizontal projection may be rational, and not be so because of the relief.

With elevated commands, one can see the country afar, but an enfilades the ditches and scarps by a plunging fire, that does not produce the efficient effect of a sweepink fire. It is then necessary to combine these two conditions.

We shall soon see how the last military architects of the middle ages attempted to solve this twofold problem. The castle of Vincennes, for the time when it was erected, is no less an attempt at this, all whose importance has perhaps not been appreciated. The architect constructor of the defenses has claimed to relieve his towers from the effect of parabolic fire by giving them a considerable height, and he has claimed to utilize this command, then unusual, for the fire of the new guns and the great perfected machines, such as mangonels and trebuchets.[3]

Note 3.p.101. Article Engin.

Under the reign of Charles V one finds nowhere in France, Italy, England or Spain, a second example of the arrangement adopted for the construction of the castle of Vincennes. This is an isolated attempt that was not followed; here is the reason; then (from 1365 to 1370) [1] men scarcely began to employ cannon of very small calibre, or short iron mortars, hooped and suitable to throw stone balls in a curve, just as could machines

with counterpoises. Men did not believe that the new artillery would replace a century later those cumbrous machines, but whose fire was very accurate and with terrible effect up to a range of 492 to 656 ft. The cannon employed about the end of t the 14 th century in places consisted of wrought iron tubes a and threw balls of 2 ot at most 3 lbs, or even round boulders. These engines replaced with advantage the great crossbows, and could be placed in battery behind the merlons of towers. There was then an interest in increasing the height of these towers, for the direct fire being weak, the more it was raised, the mo more it could damage the besiegers. Besides, as we have just stated, it was important to relieve the tops of these towers from projectiles thrown in a curve by the old machines. The c curtains came relatively to have but a small height, so as to post crossbow men, who shot their bolts point blank up to about 200 ft. The machines and cannon on the platforms of the towers covered the country with great projectiles in a radius of 656 ft., and thus keeping the besiegers at a distance, the curtains were protected up to the moment, when by the works of approach, the assailants reached the crest of the ditch. In this last case the crossbow men of the curtains protected them from approach, and those on the towers took in flank the assaulting columns by a plunging fire. But although the progress of course was slow, still at the end of the 14 th century besieging armies commenced to place mortars in battery. These being covered by embankments and gabions did not have to fear much the rare engines placed on the tops of the towers, but concentrated their fire on the relatively low curtains, dismantled their parapets, destroyed their machicolations, rendered the defense impossible, and the besiegers could then proceed to make a breach by mining. The elevated commands of the towers became useless as soon as the enemy reached the foot of the scarp. About 1400 the system was then changed, the curtains were raised to the level of the towers; the built defense was reserved for close attacks, and outside that defense were erected advanced works on which were placed the guns in battery. Those were then reserved to equip these low and extended works, covering the country, and the fortress was no longer more than a sort of fort only intended for near defense.

Note 1.p.110. The castle of Vincennes, considerable remains

of which are to be seen today, was commenced by king John on new plans; but if one considers the style of the architecture, it does not appear that the predecessors of Charles V ever raised the work above the ground of the place; even if Charles V did not entirely rebuild the work.

In fact, we see that the castles built at that epoch established defenses of the curtains nearly at the level of those of the towers, leaving to the latter a command a little higher, for the oversight of the exterior, and that many of the old curtains of the 13 th and 14 th centuries are raised up to the level of the defensive galleries of the towers. [1] Then men entirely renounced placing guns in battery on these towers, the platforms disappeared fro a time, and artillery was employed by the defense only to sweep the approaches.

Note 1.p.111. This fact is very apparent in the works undertaken by Louis of Orleans at the castle of Coucy and of Montepilloy near Senlis.

The castle of Pierrefonds was entirely built by Louis of Orleans, and furnishes us with precious data in that respect. Not only the works of excavation and restoration undertaken in that fortress have permitted the exact recognition of the arrangement of the towers and curtains, i.e., of the close defense, but t they have brought to light a series of advanced works of small height, that formed a zone of defense to receive artillery. T These works explain how the troops sent on two occasions by H Henry IV with artillery to take this castle, could not get possession, and how in the minority of Louis XIII, it was necessary to undertake a regular siege t reduce it.[2]

Note 2.p.111. These works were commenced in 1858 by order of the emperor, and in great part by means of credits opened on his majesty's privy purse.

These observations will illustrate only the towers of Vincennes, that date from the reign of Charles V, possess platforms suitable for placing artillery, and why they have a considerable command of the curtains, while the towers of the castle of Pierrefonds, built about 30 years later, present no arrangement suitable to receive cannon, and have but an insignificant command of the curtains. We see that after 1400, the military architects follow step by step the progress of artillery, sometimes giving to these cannon a command of the country, sometimes pla-

placing them at the bases of the towers, and reserving them to sweep the crests of the ditches; sometimes making them independent of the old defenses retained, and employing them to retard the works of approach by means of advanced works, ramparts, cavaliers, etc. [3]

Note 3.p.111. Articles Architecture Militaire, Boulevard.

Fig. 33 gives the plan of the ground story od one of the towers of the castle of Pierrefonds, [4] at the level of the ground of the court and above the two stories beneath that ground. At A are barracks against the curtains B. Conformably to the customary arrangement, it is necessary to enter the tower occupied by a post to reach a stairs ascending to all the stories. The doorway of the post is at a. Three windows light that room, n near which are found the privies at b. At c is a fireplace.

Note 2.p.111. Tower of Hector.

The section on f e (Fig. 34) explains the various services of this work. The level of the defensive gallery of the curtains is at V, and the upper battlements of these curtains at t the base of the roofs of the buildings are at the level G of the defensive galleries of the towers; thus there towers have only the command G K over the curtains.

The four upper stories, including the ground story, are covered by floors, but the two stories below the ground of the court, which is at L, are vaulted. One even notes that the vault V is covered by a thick layer of rubble, that protects it from fire or the fall of the upper parts.

The screw stairs stops at the level of the floor of the second cellar, for the first cellar B is a dungeon into which one descends only through the opening pierced at the middle of the ellipsoidal vault constructed by horizontal courses corbelled. O One cannot doubt that this cellar was destined to serve as a d dungeon or prison, since it has a privy O and little vault.

The ground of the lists or of the external military road is at the level P beside that tower.

The dungeon B receives neither air nor light from the outside. One notes that the masonry of the cylinder at the level P is 17.1 ft. thick, and that behind the facings of cut stone inside and outside, this masonry is composed of well beeded rubble a and of great boulders of extreme hardness. [1] It was then not easy to sap a work so constructed, defended by a circle of ma-

machicolations of the defensive gallery G. This work dates from 1400. No trace of the upper platforms to place large guns in battery. Mortars, "passe-volants, veuglaires, basilics" and culverins were placed on the outer works, i.e., on the crest of t the plateau that served as base for the castle, so as to strike surrounding valleys. The upper defensive galleries were occupied at the time of the construction of the castle of Pierrefonds, only by crossbow men or archess opposing a near attack.

Note 1.p.114. It required 27 days for a skilful workman to make a hole about 3.3 ft. square in one of these walls above the batter, i.e., at the point where the masonry was only 13.1 ft. thick.

Yet from the day that the besiegers possessed artillery of sufficient calibre to be able to batter the outworks and extinguish their fire, it was necessary that the last defense, the castle, could oppose cannon to the assailants. Then from the epoch of the war against the English, the architects endeavored to find means of placing guns on the towers. [2] To obtain th this result, they gave them less height, increased the thickness of their circular walls and vaulted them to support a platform; or indeed retaining the old system of upper defense of the 14 th century intended for crossbow men, embrasures for cannon were pierced at the bases of these towers, if they were b built on an inclined site, so as to batter the approaches. [2]

Note 2.p.114. At the siege of Orleans several of the old towers of the walls were terraced to receive artillery.

Note 3.p.114. In Art. Chateau, see the description of the d defenses of the castle of Bonaguil (Figs. 28, 29).

It must be stated that then the cannon that threw projectiles point blank were of small calibre; those pieces shot lead balls, but more frequently of iron pyrites or small spheres of hard sandstone. The latter projectiles could not have a long range. As for the great cannon reserved for the exterior or the platforms of towers, during the course of the 15 th century, they rarely threw any but stone balls in a curve, i.e., a parabola. However at th time of the siege in 1428, the artillerists of Orleans possessed cannon sending balls point blank to 1969 ft; [4] these guns were all placed on the old towers or on outworks; [5] as for the curtains, they were equipped with machicolations and galleries of masonry or of wood. In fact for a long time the

artillery was placed in battery on the towers to command the a approaches, or at the base of the towers to enfilade the ditches and protect the curtains, that only defended themselves by the aid of the old arms against a near attack. Thus at the end of the middle ages the part of the towers takes more, instead of less importance. More distant from each other, they projected more from the curtains in order to flank them better; they were sometimes almost entirely detached, especially at salients; their diameter was considerably increased, reinforcing their w walls and they are casemated. Often even the upper battery, i instead of being uncovered, is protected by a shell of masonry and earth. We cannot state whether that innovation of covered batteries is due to France, Germany or Italy. Francisco di Giorgio Martini, architect of Siena, who lived at the middle of the 15 th century, gives several examples of those towers with covered batteries in his Treatise on military architecture. [1] We have found in France traces of these coverings in works in the form of towers protecting salients, [2] and that did not forbid the use of the old machicolations and parapets.

Note 4.p.114. Art. Siege, p. 426.

Note 5.p.114. Art. Boulevard.

Note 1.p.115. Trattato di architettura civile e militare by F. G. Martini, first published by the care of the chevalier Cesar Saluzzo. Turin. 1861. See the atlas, pls. 5, 22, 23, etc.

Note 2.p.115. At Longres, at Dijon, the old castles, 15 th century; at Marseilles, end of 15 th century (demolished north front); perhaps at the castle of Ham before the reconstruction of the platform of the great tower, built by count S. Pol, whose walls are 32.8 ft. thick.

Here (Fig. 35) is an example of these sorts of towers. At A is traced the plan of the work at the level of the ground of t the place. The hall D is pierced by embrasures for 3 guns; a stairs is open to the meddle of that hall and permits descent into the outworks C', whose plan is detailed at G. [3] The hall D is vaulted and open next the place, both to aid the defense and to allow the smoke to escape. The tower is furnished with a crenelated parapet with machicolations in form of inverted pyramids to facilitate firing downward anf better protect the battery. On the platform is established a casemated battery with 4 embrasures, as indicated by the plan B. These embrasures

command the exterior over the crests of the merlons. A traverse in masonry protects men posted behind the parapet from enfilading and from the rear. The vaults of the battery and of the outwork are covered by stone dust and earth, beaten and turfed. The defensive system of this tower is easy to understand. The lower battery with the two guns sweeps the curtains, strikes the ditch and flanks the adjoining towers, with its gun g it defends the counterscarp of the ditch opposite the dead point. The high battery protects the exterior; the outwork prevents the passage of the ditch; the battlements and machicolations protect the base of the work from near attacks and sap.

Note 3.115. The name of "moineau" is given to a small and low projecting work placed at the bottom of the ditch, defending it and able to contain musketeers or even crossbow men. (In Art. Boulevard see the great work of Schoffhausen, the circular defenses that fulfil exactly in the ditch the purpose of the moineau).

The uncertainty appearing in the defensive works of the second half of the 15 th century is evident here. Men dared not entirely abandon the form and purpose of the old tower. During a siege they did not seek to break into a fortress by its towers, b but by its curtains. The military architects of the 15 th century had no other purpose than to appropriate the towers to the new engines, to make them thicker to resist the shots of the a assailants and the vibration caused by the artillery that they mus contain, to protect them from curved fire, and to give them a more efficient flanking. It was desired to retain for them a command of the exterior and even of the curtains, and in erecting them it was feared to expose them too much to the shots of the enemy. One feels that those parapets and machicolations we were a weak defense against balls, easily overthrown much before the moment when most needed, and yet men felt unable to omit them, they had so much the habit of regarding this near defense as a serious protection. Yet these machicolations and battlements disappeared first in the strongly combined defenses about the end of the 1; th century. The upper batteries, intended to prevent approaches, descended to the level of the ditch and became an outwork covering the bases of the towers. Fire in ricochet was not yet employed. The batteries of the besiegers could not destroy what they did not see; now the outwork being covered

by the counterscarp of the ditch, remained intact until the mo-moment when the assailant prepared to cross the ditch to attack the scarp and towers. Thus it became an obstacle opposed o near attack, and remained standing when all the upper defenses had lost their crests. But already about the middle of the 15 th century, besieging armies carried with them bronze guns on carriages, which threw cast iron balls. [1] These projectiles being shot point blank against th towers, covered the outwork with fragments of stone and filled the space that separated to these outworks from the defense, if they were ruined. Towers with short flankings and of small diameter became more injurious that useful; men thought of entirely suppressing them, at least to support them by new works arranged to receive artillery, indeoendently of the earth ramparts built before the weak points. These new works belonged to the place. Built at a distance of half a cannon shot, they took the form of great cylindrical towers, receiving guns with long range on their tops to batter the exteriors and enfilade the fronts of ditches, being at their feet for a close defense and to send sweeping projectiles over the earth ramparts, that covered the salients or the gates. [1] Then at the end of the 15 th century the feudal castle could not have sufficient extent to defend itself efficiently against artillery. Cannon completed the ruin of feudalism. To resist the artillery required extended fronts; cities alone were suited to this kind of defenses. Extending the fronts, it was necessary to flank them. Men could at first provide for t that necessity, endicated by the nature of things, only by means of earth ramparts established outside salients anf gates, which ramparts crossed their fire; then as in all fortification, what defends must be defended, men found nothing better t than to establish along old walls behind the ramparts great towers having sufficient height to command thise ramparts and the outside over their parapets. The systems invented by the military engineers from the 16 th century until our days, are then in germ in the first experiments made at the end of the 15 th century in Italy, France and Germany. The Germans being especially conservators, still possessed intact examples of these works, a transition between the old system of fortification of the middle ages and the modern system. From this point of view, Nuremberg is the most interesting city to study.

Note 1.p.117. Too late a date is generally given to the invention od the cast iron ball. Already about 1430 French and a German artillery used them. The inventories of the artillery of Charles VII make mention of them. Vignettes of manuscripts of 1430 to 1440 represent iron projectiles. At he museum of artillery exists a bronze cannon of 1423 brought from the island of Rhodes, cast in Germany, that could only be used to throw cast iron balls. At the defense of Orleans in 1428, the artillerists of Orleans had cast iron balls.

Note 1.p.118. later Castrio to (1584) adopted anew round towers in the meddle of bastions, separate and in the middle of curtains. Vauban himself in his last manner (1698) established bastioned towers forming terraces separately between bastions intrenched in permanent fashion and the body of the place, a sort of forts that must inevitably delay the surrender of the place, since the fall of the bastion not only did not lead to that of the adjacent defenses, but required considerable works to take the bastioned tower forming a salient flanking. Montalembert (1776) also placed separate "caponnieres" (rifle-pits) built of masonry in several stories at the rears of bastions, which are nothing but casemated towers having a considerable command over the outside. At the base the rifle-pit of Montalembert is surrounded by a series of projections, forming in al plan a series of star point projections, flanking each other, for pos ing riflemen. The Mermans in our days have returned to towers having a command over the works. But in the presence of the destructive effects of the new artillery, this system cannot be of great value, unless one can face these casemated towers with a shell sufficiently strong to resist projectiles. T These experiments repeated constantly since the middle ages only prove that the command of the exterior is always regarded as necessary, and that the fortification of the middle ages ((in regard to the means of attack) had an advantage over our own.

The general plan of Nuremberg takes the form of a trapezium with rounded angles, with a culminating point near one of the angles, occupied by an old castle. A double enclosure of the 14 th and 15 th centuries with square flanking towers and wide external moat filled with water and with counterscarp, entirely surrounds the city, its width being crossed by a river. Albert Dürer erected a great tower at each angle, and a fifth one near

the castle on the highest point of the city. Gates are opened in the vicinity of the four towers, which are protected by advanced works. From the tops oc each of the five towers are s seen the other four. Those of the enclosure protect the salients, flank two fronts, command the gates, enfilade the lists between the two enclosures, and observe the country over the outworks of the gates. These towers are about 66 ft. diameter at 16.4 ft. above the ground, are built battering in courses of hard sandstone with bosses below and near the top. In the ground story they have a vaulted chamber, but drawn in such a way as to leave to the masonry a considerable thickness from the exterior. (See plan, Fig. 36).[1] The interior of the city is at A' at B are the lists between the gate of the outer enclosure and that C of the internal enclosure; the postern D permits one to descend into the ditch. At a is placed a wide machicolation that defends the entrance into the lower hall, and at b is a square opening in the vault, placing the like-- wise vaulted second story in communication with this ground story. One ascends to the upper platform only by a stairs made in the theckness of the wall and starting from the level of the defensive galleries of he curtains. At d are two chambers with embrasures for guns. Fig. 37 gives the perspective view of this tower.[2] The outworks date from the 15 th century; in this work Albert Dürer built only the tower of the gate connected w with it. The room in the second story was intended to lodge the post, for it had no embrasures. Its thick vault bears the circular upper platform surrounded by a protection of great timbers with openings for cannon with shutters.[1] A covering also of carpentry receives the conical roof, formerly surmounted by a watch-tower.[2] At A we have traced the profile of that upper o platform.

Note 1.p.119. This tower is the one thot commonds gote Loufer.

Note 2.p.119. The five towers ore built on the some model.

Note 1.p.120. Article Creneou, Fig. 19.

Note 2.p.120. Excepting these wotch-towers, the towers of Nuremberg ore intoct. The wotch-towere ore indicoted in old engrovings.

These elevated commands were rarely adopted in France after the end of the 15 th century. French engineers rather sought to enlarge the parts, to extend the field of fire, rather than

to obtain a considerable command. They preferred barbette batteries to those covered batteries where the service was obstructed and men were suffocated by the smoke, as between the decks of a man of war. Besides, assuming these towers to be battered by artillery, even at a great distance, the convergent fire of the enemy must quickly destroy those timber protections, that like the bulwarks of great vessels, do not have the advantage of mobility given by the sea, and serve as points to aim at. However long the range of the pieces placed in battery on the platform, these guns could oppose only a divergent fire to the artillery of the besiegers, receiving ten projectiles for one that they sent. [1]

Note 1.p.121. In our time the famous Malakoff tower, that w was an elevated commanding work, was destroyed first in the s siege, and the resistance of that point depended on the earthworks constructed around the primary defense.

Yet some attempts of this kind were maed on thes side of the Rhine, but the French towers of the beginning of the 16 th century had a greater diameter, less height and were crowned by barbette batteries with gabions or caponnieres, like that presented in the preceding example. Most frequently these were m made actual flanking towers, i.e., they were given a horseshoe form in horizontal plan, and their upper batteries scarcely exceeded the level of the crest of the curtains. (Fig. 38).

Yet there is always an advantage for the besieged in obtaining elevated command, or at least watch-towers permitting the discovery afar the works of approach of the besiegers, to establish on the entrenched bastions forts in horseshoe form on the ditch, so as to make difficult the occupation of the bastion. This need explains why were maintained so late the old towers of places of the middle ages behind bastions or half-moons; why Vauban in his third manner attempted to return to those towers dominating the bastions, and also why Montalembert made of these dominant towers one of the principles of his defensive system. In our days and since the marvellous progress of artillery, the question is proposed anew, how these towers can serve as traverses to protect the defenders from shots on the flank, and defy the effects of ricochet fire. The difficulty is to cover these towers with a facing capable of resisting modern projectiles, for however thick their masonry, it would

soon be destroyed by the great shells of our artillery, and one of those projectiles penetrating . casemate would cause su- such disorder there, that the defense would become impossible. It is not alone the covering that is necessary to find, but also for the embrasures a shield that entirely stops the enemy's projectiles, while allowing the guns to be aimed.

There exists a nearly intact example of the defensive system of the transition, or of the use of towers (not old towers re- tained), but towers built to receive artillery) enters into t the general plan of a strong flace according to a systematic principle; the place is Salces, commenced in 1497 and termin- ated about 1503, under the direction of an engineer named Ramirez.

Near Perpignan, the place of Salces is situated between the pond of Leucate and the mountains; thus it commands the passage from Roussillon to Catalonia. Built with great care, it consi- sts of a parallelogram flanked at the angles by four towers. Two half-moons cover two of the fronts. A keep occupies the th third, and a half-moon forms a salient at one angle. The works are casemated; the towers and half-moons are crowned by platf- orms to receive artillery. Small pieces were also placed in o battery in the lower stories of the towers to enfilade the dit- ches. The works designated as half-moons are actual isolated flanking towers, open at the rear and joined to the casemates by caponnieres or covered galleries pierced with loopholes for musketry. [1] A ditch about 49.2 ft. wide by 23.0 ft. deep enclo- ses the entire castle. This ditch can be filled with water to the level of the court of the castle and even higher, and is o placed in communication with the castle by narrow posterns. Further, other exits opened in the counterscarp really open i into the outside, for in the legend added to the plan of the castle of Salces given by chevalier du Beaulieu, [2] is read:-- "There are more barracks underground in the castle; for it is casemated and countermined everywhere, and one passes under the moats to go outside." Man certainly did not pass beneath cunette of the inundated ditches, but at the bottom of the di- tch, in the casemated galleries that communicated with a cover- ed way made behind the counterscarp; a covered way to which one finds again certain galleries excavated on the ditch and thence outside, protected by advanced earthworks.

Note 1.p.123. See to Monographie du chateau de Salces, by J

Capt. Rotheau (Paris. 1880. Tanera). This study of that old place is very well done and gives the most complete idea of it.

Note 2.p.123. Plans et profiles des principales villes et lieux considerable de la principaute de Catalogne. Paris. 168-.

But what gives to the study of towers of the castle of Salces a marked interest, is the manner in which they are arranged to shelter the defenders. In fact, except the road between the pond of Leucate and the last piers of Corbieres, the place of Salces is dominated by these heights. The towers, curtains and half-moons are subject to sight from the rear and enfilading.

By raising the parapets of the towers on the dangerous side and by establishing "parados" opposite the rears of the opposite towers, the engineer covered the platforms. Raising the parapets at the side next the mountain placed the embrasures under cover, while those on the opposite side are open to the sky.

Fig. 39 presents a birdseye perspective of one of these towers. One sees at A the elevated parapet protecting the gunners and pieces placed on the platform, just as would do a cavalier or traverse. The curtains are only built for musketry and are not furnished with embrasures, but have a parapet B and elevate those opposite the higher ground that look on the castle. Watch-towers C occupy the reentrant angles between the towers and curtains, and can receive musketeers, whose fire flanks t the scarps. Further, small cannon placed in the vaulted and sufficiently ventilated stories enfilade the ditches and about the tops and batter of those towers.

Fig. 40 gives the perspective of one of the half-moons with its raised parapet at F to cover the platform from the enfilading views from the neighboring heights. In that Fig. will be observed the projecting beak, that reinforces the half-moon in front, and that covers a part of the dead angle by which the besieger could profit, for these half-moons are incompletely flanked by the angle towers.

The platforms are not sufficiently spacious to be able to equip all the embrasures with large cannon. The engineer either counted only on placing falconets in battery or on changing the places of the guns as need.

"Great precautions are taken against mining," says Capt. Rotheau: "a gallery extends along the four curtains before the

cellars, and at certain distances are ingeniously arranged short listening galleries."

TOURS REDUIT tenant lieu de donjons ou dependant de donjons.

Fortress Towers taking the places of Keeps or dependant on Keeps.

The oldest keeps are scarcely more than great towers near one of the fronts of the feudal castles, commanding the outside on the side that can be attacked and all the works of the fortress, with a special exit to the outside and a gate opening into the court of the castle. (Arts. Architecture Militaire; Chateau; Donjon). But certain strong places possessed forts, that must rather be regarded as dominant and independent towers than as keeps. Then about the end of the 13 th century the keeps became actual residences enclosing the services suitable for a habitation, and often reinforced by formidable towers that command the exterior, protect these lodgings and at need are forts able to hold out, if the keep were partly ruined by mining or fire.

There are still seen at Compeigne the ruins of a great tower of the beginning of the 12 th century, near the old bridge over which passed Joan of Arc on the day that she was taken by the English, and which is one of those works serving as a f fort beside an enclosure. At Villeneuve-sur-Yonne, there also exists on the front opposite the river a great cylindrical independen tower, which served as a fort and commanded the country. This tower belongs to the 13 th century. The castle of Carcassonne possesses on the front facing the exterior on the side of the barbican and the Aude, two towers on rectangular plans and near together, that take the place of a keep; these towers date from the 12 th century and were raised at the end of the 13 th. (Art. Architecture Militaire, Figs. 12, 13). The palace of the Popes at Avignon, properly speaking, possesses no keep, but several fortress towers, that command the exterior of the fortress, and that date from the 14 th century. It is then necessary to distinguish in this Article fortress towers belongiug to castles from towers belonging to keeps. We shall first occupy ourselves with the former.

It is again necessary to resort to the walls of the city of Carcassonne to find the most characteristic examples of these towers, a sort of keeps supporting a front. Along the first en enclosure of this city toward the southeast exists a great cyl-

cylindrical tower, almost entirely detached from that enclosure, and that is named tower of the Vade or of the Papegay. [1] It is built on a salient and opposite the highest part of the plateau, which on that side faces the ramparts. Its base is flanked by a redan of the curtain and by the tower that we have given in this Article. [2] It dominates afar the vicinity, is entirely closed and was commanded only by the tower, that behind it belongs to the inner enclosure. It contains five stories, of which three are vaulted. In case of war, its upper battlements were equipped with wooden galleries. [3] The floor of the lower story is a little above the leved of the bottom of the ditch. This lower story possesses a well.

Note 1.p.126. Art Architecture militoire, Fig. 11. It is the tower marked O on the plan.

Note 2.p.126. Tour de la Peyre, Figs. 13, 14, 15, 16, 17.

Note 3.p.126. This tower depends on the wall built under the reign of S. Louis.

We give the plans of this tower in Fig. 14.

The story A is in the ground story for the military road of the lists L between the two walls of the city. The covered way of the curtains of the external enclosure is at c, the ditch being at f. From the military road one ascends to the covered way by a flight d of a dozen steps, then finds himself before the only door e of the tower, that admits to the vaulted hall S. By taking the stairs f, he descends to the lower story B, likewise vaulted. This stairs ends at g'. A recess from g' to g permits hoisting by a windlass water or provisions to the level of the floor of the ground story. The well is at o. This cellar is only lighted by two elevated air holes i. From the hall S of the ground story, one takes the stairs k, ascending to the hall S, landing at l. That hall S is vaulted, has a fireplace m and is lighted by four slots and an elevated opening. From this hall S' by taking the stairs n one ascends to the third story S" covered by a floor; this stairs lands at a. Resuming the stairs o he reaches the upper batteries. This third story has 4 windows and privies at t. It will be noted that t the hall S of the ground story is pierced by 7 slots, that enfilade the crest of the counterscarpof the ditch. If we make a section a b, and we take the part of this section next the lists, we obtain the section in Fig. 42, a section that permits

account to be taken of all the exits of these stairs. The level of the bottom of the ditch is at N and the level of the battlements of the curtainsis at B. At E is traced the plan of the u upper battlements, their floor being reached by the stairs h. Wooden galleries were placed all around these battlements, as we have partially indicated at V V'. By the windows r r (see at D, Fig. 14) the post enclosed within the tower saw the upper parts of the inner wall and communicated or received orders. Thirty men could easily lodge in this tower, could store provisions there for a long time, have water and cook. Thus it was a fort still defending itself if the outer wall fell into the power of the besiegers. The sole narrow entrance was barricaded and closed by heavy bars.

The tower du Tresau of the same city of Carcassonne is also a fort, attached to the enner wall and depending on the works due to Philip the Bold. We give that beautiful tower in Art. Construction, Figs. 149, 150, 151, 152, 153, 154.

The tower du Tresau greatly dominates the curtains, and further has two watch-towers, that allow to be seen the entire vicinity of the city on that side, the castle, the tower of the western angle to the opposite salient, and the entire north front. (See plan of the city, Art. Architecture militaire, Fig.11. [1]

Note 1.p.128. The tower du Tresou is marked M on that plan. (Also see Art. Porte, Fig. 18).

It would be superfluous to furnish a great number of examples of these towers, which differ from closed flanking towers only by their relatively greater height and diameter. The well defended walls always possessed a certain number of tower forts more or less important because of their extent: some enclosures of an unimportant extent somentimes possess but a single one. Such is the enclosure of Villeneuve-sur-Yonne. This tower then replaced the castle and was surrounded by a curtain wall. Towers dependent on castles and taking the place of keeps, on the contrary like the keeps themselves, present a great variety od forms. Some are independent, can be isolated at need, possess a curtain wall, have their doorways elevated above the external ground; others are like the fort of the keep and are attached to it by a point; they are to the keep what that is to the castle. There should not be lost from view the true function of the keep, which is the habitation of the lord; now it is very

rare to find keeps, like those of the Louvre and of Coucy, that do not consist of a great tower without additions. We see that the Norman keeps, for example those of Berry and of Poitou, habitually consist until the 13 th century, of a great rectangular residence divided into two halls in each story. This keep was always the habitation of the lord. The keeps of the Louvre and of Coucy are exceptions, and only served as the feudal habitation in time of war. (Art. Donjon).

In all castles of some importance, there is a stronger portion, whose walls are thicker, and that dominates the other works; the part that is really the keep. Either this keep is reinforced by a higher and stronger tower than the flanking towers; or indeed beside the part of the castle particularly reserved for the habitation of the lord is an isolated tower that in case of siege becomes the fort into which the lord retires with his faithful men, his family and his most precious possessions. Shut within this tower, he surveys the outside (for these works are erected on the most accessible point); it contains its garrison, and can sustain a second siege when the castle proper is taken. If the castle does not occupy a sufficiently large surface of ground suitable to receive the buildings for the g garrison, a court, a residence for the lord or a complete keep, if it had a small extent, in ordinary times the lord and his attendants occupied the habitation; in time of war he called the liegemen who owed him military service, recruited and paid soldiers, and he with his relatives retored into the strongest tower, which thus became the keep. We find the very evident t trace of this custom until the 14 th century in the strong places of Guienne, interesting though small. Earlier in the castles of Isle-de-France of mediocre extent, we can likewise recognize that arrangement. Scarcely do the effaced characteristics of our century permit us to understand the life in time of war of a land possessing important fiefs and a beautiful and grand feudal habitation; but how far are we from representing to ourselves accurately the moral and physical energy of those castellans possessing fortresses of little extent, and in which however they did not hesitate at need to defend themselves against neighbors ten times more powerful. In these contracted places, the castellan was surrounded by a small number of vassals on whose fidelity he could always rely, and shut himself

within the master tower, there provide for the outer defense, anticapate treason, and inspire enough fear and respect in the garrison that it would not be tempted to abandon him. Then (and this fact often occurred) the castellan and some faithful men, with bridges cut and portcullises lowered, doors and windows barricaded, defended themselves to extremity, until the provisions failed.

thi. system of a fort, suited for an extreme defense, is adopted in an absolute manner in the great ruined tower of the castle of Montepilloy nea: Senlis. At one side this tower looked on the bailey of the castle, at the other on the castle itself, which had littl- extent. [1] We speak here of the castle as it existed in the 12 th century before the additions made by Louis of Orleans.

Note 1.p.131. This castle belonged to the Valois and was partly rebuilt by Louis of Orleans, when tha prince fortified his duchy during the illness of Charles VI. The castle of Montepilloy, located on a hill and commanding the road from Senlis to Crespy, served as a point of support for the armies of the parties, that maneuvred in that country during the wars of the 15 th and 16 th centuries. It was dismantled after the entry of Henry IV into Paris.

We give (Fig. 43) the plan of the second story of that tower at the level where opens the only postern giving entrance to the interior. At A is the door that allows one to descend by a vaulted stairs in the thickness of the cylinder to the lower story: at B is the door by a long stairs, also vaulted, that gives access to the third story at C, and to the chamber D of the portcullis of the machicolations of the postern. Continuing the ascent by the stairs, one reaches the fourth story. The postern P is then elevated above the external ground by the entire height of the ground story. It is reached only by a wooden footbridge easily destroyed . This postern was closed by a grille and portcullis, a machicolation and a barred door. A little r room E sufficient to contain two men has an oblique slot, that enfilades the floor of the footbridge. That floor had a trap through which by a ladder one passed by the pier of the bridge to the defensive gallery of the curtain G. The space between this curtain and the tower then formed a sort of ditch. [2]

Note 1.p.131. Later Louis of Orleans caused a part of this

curtain to be destroyed, and built a curtain at F, which enclosed the new work.

The section made at a b (Fig. 44) shows at A the tower of Montepilloy as it existed in the 12 th century, and at B with the modifications made in the defenses in 1500, in the upper parts. At C is seen the section of the curtain, at P the section of t the postern, and at D is that of the room of the portcullis and macnicolation over that postern. It will be noted that the ground story is vaulted, as well as the story above, by means of pointed arches of rectangular section resting on five piers. T This upper vaulted hall is divided by a floor, which is the t third story. The third story is entered by the door I and remains as it was in the 12 th century, except that in the 15 th century its wall was cut away at one point to place there a s screw stairs, intended to ascend to the fifth and the battlement story with machicolations. The height of the old tower did not exceed the level N. Then the galleries H gave a plunging fire outside the curtain, as indicated by the dotted line. This fourthstory was intended for storage of projectiles and for the upper defense, made by a series of arches some remains of which are sunk in the masonry of 1500; arches that connected the upper hall with the defensive galleries. This defense appearing not to have a sufficient command, that story was raised on arches in 1500; it was vaulted at V, and on that vault was established a platform with parapet and machicolations M, whose plunging fire struck the foot of the scarp of the curtain as indicated by the dotted lines on that side. It is clear that the footbridge S that connected the tower with the castle could be removed easily. At A is represented the ladder that from the trap of that footbridge allowed one to descend behind the pier by the defensive gallery of the curtain.

Fig. 45 gives the development of the interior of the tower of Montepilloy from e to f (see plan, Fig. 43). The stairs, taken in the thickness of the cylindrical wall, are indicated by dotted lines. At A is the postern and at B above is the room of the portcullis and machicolations. At C is the arcade that from the upper gallery opened into the wooden gallery before the increased height in the 15 th century.

This construction is well made in regular courses of 1.05 ft. height, and the entire work would be intact if half the cylinder

had not been blown up by a mine. Happily the part preserved is that presenting the greatest interest, in that it contains the stairs and postern. Naturally there was blown up the parts looking to the exterior, when it was desired to dismantle the castle.

When one visits the castle of Montepilloy, he understands w why Louis of Orleans judged it necessary to raise the tower and terminate it by a platform.

Possessor of the duchy of Valois, claiming to make of that territory a vast military network suited to dominate Paris, it was important to have near Senlis on the road to the capital a point of observation, that could uncover the length of that r road from its exit from Senlis to Crespy. Now he could not choose a better point of observation, which being occupied by a garrison on a hill, allowed the obstruction of passage to all armies leaving Senlis. This garrison further had the certainty of being supported by troops shut up in Crespy, Bethisy, Vez a and Pierrefonds, if that army attempted to force a passage. The men from Montepilloy had no reason for anxiety, if cut off from their own castle, since they could fight in retreat to Crespy a and even farther, defending foot by foot the road leading to the heart of Valois. But for those obstacles to be efficient, it was necessary to have time:- 1, to place themselves across the road or on its flanks, at the moment when an invading army left Senlis; 2, to warn by signals or messengers the garrisons of the castles of Crespy and of Bethisy, each located five miles from Montepilloy, so as to be supported on the flanks.

Now to make these military arrangements, it was of great importance to give to the tower of Montepilloy the height that we know.

It is necessary to consider that the heights of this sort of towers depended far more on their strategic location than on h their proper defense. Men habitually consider too little the s strategic arrangements in the fortresses of the middle ages. They are studied separately with more or less attention, but little account is taken of the support that they lend for defending a territory belonging to the lord, or to the lords allied for common defense, a fact presented. The frequency of struggles between castellans did not prevent them from uniting against an invader at a given moment; and this fact presented

itself notably at the journey of S. Louis in the valley of the Rhone to reach Aigues-Morts. That prince reduced the little fo fortresses which commanded the river, whose possessors all defended themselves against his army, although those castellans were perpetually at war with each other.

To speak of only one province that has preserved a great number of feudal remains, Valois, one will note that the military posts were arranged in view of a common defense at need, much before the sovereignty of Louis of Orleans, and that prince m merely improved and completed an already strong strategic situation.

Valois was bounded on the northwest and north by the course of the Oise, Aisne and Vesle, on the southeast by the river Ourcq, at the south by the Marne. It was widely opened only on the side next Paris, at the southwest from Gesvres to Creil. N Now the castle of Montepilloy is placed on guard between those two points on the road to Paris passing by Senlis; it was supported by the castle of Nanteuil-le-Hardouin on the road from Paris to Villars-Cotterets, and that connected with the castle of Gesvres on the Ourcq. This was the first line of defense covering the most open frontiers of the duchy. Behind was a second line of places resting on the Oise and following the little s stream of Automne; Verberie, Bethisy, Crespy, Vez, Villers-Cotterets, Ferte-Milon on the Ourcq, and Louvry beyond. Behind these two lines, Louis of Orleans established as a seignorial f fortress the place of Pierrefonds in an excellent position. I Isolated towers were erected or old castles were enlarged on the banks of the Aisne and of the Ourcq. The passage from Champagne into Valois between these two rivers was commanded by t the castles of Ouchy on the Ourcq and of Braisne on the Vesle, covered by the forest of Daule.

At the north and outside Valois in Vermandois, Louis of Orleans had purchased and restored the place of Coucy, which covered [illegible]. All these castles (except Coucy) were placed on communication by direct views of each other by means of those high towers or by intermediate posts. Thus for example, the castle of Pierrefonds was placed in communication by signals with that of Villers-Cotterets by the great tower of Realmont, whose ruins are still seen on the highest point of the forest of Villers-Cotterets.

The expeditions attempted by Louis of Orleans, and that had but mediocre success, did not prove the military talents of t that prince, but it is certain that when he resolved to establish himself in Valois so as to make himself master of the power and dominate Paris, he must have turned to a skilful man, for those measures were taken with perfect knowledge of the l lolacities and the eye of a strategist. Thus the first act of the duke of Burgundy after the assassination of the duke of Orleans was to send troops into Valois, to lay hands on that formidable network of strong places.

Thus one should not confuse the keep, properly so-called, or habitation of the lord, the last fort of the garrison, with t those towers independent of those purposes, that were erected according to a strategic arrangement to establish communications between the different places in a province, and to furnish means for isolated garrisons to combine their efforts.

Feudalism in France and in England possessed this special m military character; that which we see expressed in also a general manner in Germany and in Spain, unless it was by the Moors in the last country. It seems that with us those defensive arrangements in general must be more particularly due to the Normans, who at the time of their entrance on the soil of Gaul understood the necessity for combining defensive means to ensure their domination. So we see them lose the ground, when they have taken possession of a country; and of all conquests recorded since the Carlovingian epoch, those of the Normans were almost the only ones able to ensure a durable possession to the conquerors; we think that the French nobility profited by that instruction, and in spite of the feudal subdivision, understood early this law of solidarity among the possessors of a country. The unity to be later established by the monarchy was then in part prepared by a system of strategic defense of the ground, by provinces, valleys or water courses. Philip August appears to be the first that understood the importance of that fact, for we see him systematically break those lines or networks of fortresses, by always attacking in each system the one that is the key to all others, with the sagacity of a consummate captain. S. Louis continued the work of his grandfather in war as in politics.

When the Englis were in possession of Guienne, they pursued

with system this principle of defense, and all the castles that they erected in that province, independently of their particular strength, have a site chosen from the strategil point of view. We find in Burgundy the influence of the same idea. Perhaps no province presents a more marked system of combined defense. The water courses and passages are defended by a series of castles or posts, whose sites are marvellously selected, b both for local defense as for the general defense against an invasion. These fortified points join hands as do our towers of aerial telegraphs; and the proof of this is, that most of these telegraphic posts in Burgundy are established on the ruins of the fortresses of the 13 th and 14 th centuries. Then considering the castles from this point of view, one understands the importance of towers that occupy us; they contribute a serious defense in themselves, and thus ensure so much the better the communication between the feudal garrisons and their common action. It was particularly important, that if one of these castles were taken by treason or by a sudden attack, devoted men could still hold out for some days or even some hours in these forts, from the tops of which it was easy to communicate by signals with the nearest fortress; for then the neighboring garrisons in their turn could invest the fallen place and put the agressors in the most dangerous position. That frequently happened. In France the water courses have a considerable extent, and the basins are perfectly defined; there were necessarily established by even the shape of the ground long lines of connected fortresses, that marvellously prepared for unity of action at a given time. Those are the views that do not seem to have been sufficiently appreciated in the history of our country, and which will partly explain certain political phenomena, that are too frequently stated without seeking their different causes. But all our feudal history is to be written, and to do this it will be well once for all to leave aside those commonplaces on the abuses of the feudal regime. It is very c certain that we can possess a history of our country only when we cease to appreciate our part with the fixed ideas that interfere with our understanding it, the time when we shall know h how to apply to that study the spirit of analysis and of method, that our time brings to the observation of natural phenomena, finally on the day when we shall comprehend, that history

is not a plea, but a faithful and impartial record, drawn up ti inform the judges, not to incline their opinion toward one or the other system.

But let us leave these considerations, a little too general with regard to the object that occupies us, and return to our towers.

Among those towers of Burgundy whose purpose is very marked, i.e., which were both as forts at need and posts of observati-on, it is necessary to cite the tower of Montbard, from the t top of which one pereceived the tower of the little castle that dominated the village of Rougemont on the Brenne and the cast-le of Montfort, that by a series of posts placed Montbard in c communication with the castle of Semur-en-Auxois on the Armancon.

Montbard was a very strong place; the castle occupied a broad and steep hill of Jurassic rock at the junction of three valle-ys. Of this castle remains only the enclosure and the great t tower with 6 sides, which occupies the angle of that enclosure at the highest point, so that it looks directly on the exterior above steep rocks. Fig. 46 gives us the plan of that tower, m which dates from the end of the 13 th century. The ground story A consists of a hall into which one enters only by the door a, pierced at the level of the ground of the platform; at b and c are the two curtains. The angle d profits by a projection of the rock and contains the privies. A cellar is excavated in t the rock below that hall; its opening is at e. The lower hall is lighted by twn windows and has a slot on the exterior; it is cross vaulted, and is not in communication with the upper stories. One can enter the hall of the second story only by t the defensive galleries of the curtains (see B). The angle g is covered by a stone slope; then from this level a cut-off corner corresponds to that at i. The side h is borne on the l lower arch j. The hall of the second story is lighted by twn windows looking on the exterior. A stairs is made in the thick-ness of the wall at the side of the terrace, and ascends to t the third story entirely similar to the fourth, whose plan we give (see C). The fourth story possesses three windows and two closets k, that do not exist in the story beneath, because of the passage of the stairs. These rooms are vaulted like the g ground story. A screw stairs ascends to the platform, whose plan we give in Fig. 47. This platform is defended by battleme-

battlements, and on each face by machicolations and slots. [1] Fig. 48 gives the section of this work on the line o p. Pinnacles placed on the upper batteries cause the top of the tower to be recognized afar. The crown of the keep of Coucy presents an analogous arrangement. [2] These pinnacles can further facilitate intelligence by signals, since a banner placed at the right of a certain pinnacle indicates a movement of the enemy, the arrangements made by the garrison, or the nature of the assistance expected.

Note 1.p.140. Art. Machicoulis, Figs. 6, 7.

Note 2.p.140. Many of these towers were crowned by pinnacles isolated from each other.

The door A of the lower story was masked by the terrace of t the castle, whose level rose above its lintel. The defenders charged with the guard of the tower, posted in the upper stories, commanded the two curtains, and all the efforts of an assailant, that after he had obtained possession of the castle, would have sought to penetrate into the lower story of the tower, -- which was difficult, since its door was pierced in a r reentrant angle, -- would have succeeded only to fall into a real mousetrap, since that story has no communication with the upper stories. Besides, a machicolation is placed directly over that door and makes access to it very dangerous. If from the exterior the assailants climbed by ladders the rocky peak on which the tower is built, succeeded in attaching miners to the foot of that tower, and penetrated into the hall of the ground story, -- an operation scarcely practicable, -- by that they were not masters of the work. Here the angular system is adopted for the plan of the tower, according to the method accepted about the end of the 13 th century for tower forts crowned by platforms, particularly in the southern provinces. This form suits itself better to the lodging of the men and to the arrangements for habitation than the circular form; it gave unassailable sides, and men counted on the passive strength of the salients to resist attacks. They were further flanked by upper watch-towers, or about the middle of the 14 th century were d dominated by machicolations.

In 1318 archbishop Gilles Ascelin erected the great rectangular tower of the archiepiscopal palace of Narbonne. That work is a fort, at the same time that it commands the place of the

city, the quays of the old port, the principal streets and all the surroundings. Built at the acute angle formed by the residence buildings, [1] This tower contains four stories and a platform or place of arms, below the battlements and well sheltered from the wind, terrible in that province, and able to contain a considerable mass of projectiles. Three watch turrets at the summit of the tower flank the visible angles, and the fourth angle is engaged in the palace and contains the stairs crowned by a watch-tower.

Note 1.p.142. See plan of the archiepiscopal palace of Narbonne in Art. Palais, Figs. 11, 12 and 13.

Here (Fig. 49) are the plans of that tower, at A on the level of the external ground, and at B on the level of the second story. The story A is only a circular cellar vaulted by a hemispherical dome and receiving no light from the exterior. The second story is of octagonal form internally, and is defended by slots on each of the three faces seen from the ou side. One will observe that the firing chambers of those slots are separated from the central hall, covered by a cloister vault. Above (Fig. 50) is built a rectangular hall intended for habitation (plan C). This hall was the only one possessing a fireplace. It was lighted by three windows and covered by a carpentry ceiling. The fifth story likewise presents a square hall, cross v vaulted (plan D). Then on the vault is arranged the platform, whose plan is given in Fig. 51. The middle part directly over the vault is below the defensive gallery, whose parapet is not pierced by embrasures, but only by long slots. The flanking watch-towers possess three stories of slots. The defenders penetrate into the lower story by the doors a, pierced a little a above the level of the place of arms, into the second story by the doors b, and reach the fourth story beneath the open sky by he openings d. From the screw stairs one reaches the place of arms by the door e, and the defensive gallery of the battlements by the door c. The defensive galleries extend at f around the watch-towers.

A section made on g h (Fig. 52) explains this interesting arrangement. At A is the hall intended for the habitation of the lord, all the other stories being arranged for defense. This tower possessed neither wooden galleries nor machicolations; it defended itself chiefly by its mass, composed of excellent ma-

masonry of hard stone from S. Lucie. The fronts were scarcely flanked by the watch-towers. So we think that in case of siege, wooden machicolations were placed above the parapet, or perhaps only over the watch-towers, in order to see and defend the base of the tower. This magnificent fort is a masterpiece of construction; the courses are regular in height and are selected in the heart of the stone and connected by excellent mortar. In t that mass is neither rupture nor crack; it is a mass of homogenous masonry. That palce of arms, placed at a level below that of the defensive gallery, served for several purposes. It was an excellent site for establishing machines with long range, mangonels or stone-throwers, a shelter for the defenders of a storehouse for projectiles.

About the same time, i.e., from 1320 to 1325, was erected at the castle of Curton in Guyenne a tower-fort, whose plan presents certain remarkable peculiarities. This castle was rather defended by its position and its double ditch than by its works; the principal tower alone had some importance. [1] This tower, whose plans are presented in Fig. 53, contained 5 stories and a dungeon, all covered by tunnel vaults. The single entrance b in the tower was made from the adjacent residence at the level of the third story A. By the screw stairs one descended to the lower story B pierced by two slots. By a trap c he descended into the dungeon C, composed of two narrow rooms intersecting at right angles and containing a privy. The screw stairs ascended from the third story to the three upper rooms built on the same plan, and to the platform D equipped with a parapet and machicolations. The buttresses that abut the four angles have no function other than to afford flankings for the walls of the tower , and are sufficiently thick not to need these appendages. If one examines the general plan of the castle, [2] he will see that the angle G forms a salient that flanks (imperfectly, it is true) the adjacent watch-towers. This reinforcement with the salient still had the advantage of making the task of the miner much longer and more difficult. The tower of Curton further has a height of 108.3 ft. from the level of the floor of the dungeon to the upper platform, and the four buttresses strongly increase its area. In the same province should be mentioned the square tower of the castle of Lesparre, which was a fort crowned by a platform on a vault, [3] an actual post, for the area of the

castle outside the square tower is only 7535 sq. ft. Many of those castles of English Guienne of the 14 th century have b but mediocre extent, and appear rather to be fortresses suited to guard the country than residences of lords, like our castles of the North. This is because the people of Gascony were not completely subjected to English domination, of which they had nothing tc complain, but it was to protect Guienne from the almost continual attacks of the king of France, and these numerous little castles were well placed from the strategic point of view, commanding the the course of the Garonne and the mouths of the lateral valleys, and were more suitable to guard the p province than would have been vast fortresses separated by great distances. Thus most of these little castles defended themselves by their location, some works of little importance and tower-forts, into which troops of armed men could retire and await in safety until relieved; from which they could sally a and oversee the country.

Note 1.p.147. See Guyenne militaire, by M. Leo Drouyn. Vol. II. p. 158 et seq.

Note 2.p.147. The same. Vol. II, p. 182. M. Leo Drouyn gives curious details of these little places, to which we request our readers to refer.

Note 3.p.147. The same. Plate 132.

In Normandy, where the English domination at the beginning of the 15 th century was contested by a large portion of the people, where it was necessary not only to protect the province against external, but also from those inside it, the rare fortifications erected by the English have an entirely different character. They tend to extend and reinforce important places, so as to have numerous garrisons centralized at certain strategic points. Thus the castle of Falaise, whose position was so important, was reinforced during the English domination, i.e., f from 1418 to 1450, by a great cylindrical tower, that formed an addition to the Norman keep of the 12 th century (Fig. 54).[1] The castle of Falaise covers an area of 3.7 acres; the keep consists of connected rectangular buildings according to the Norman custom, was not high and did not sufficiently command the exterior; the English added to it the great tower A, called the Talbot tower, that contains 6 stories, including the dungeon and the attic. This great tower-fort is crowned by

machicolations with a defensive gallery. The upper battlements and the roof exist no longer since the religious wars of the 16 th century. Several old square keeps of the Romanesque epoch were simply regarded as residences at the end of the 14 th and beginning of the 15 th centories, residences that were reinforced by great annexed towers. This arrangement was the motive of a new programme at that epoch, followed in structures erected at a single spurt. Men set themselves to building keeps c consisting of a spacious and habitable residence for the lord at all times, and flanked this habitation by strong and high towers commandind the exterior. According to that principle was conceived the keep of the castle of Pierrefonds. [1] Next the exterior this keep is actually protected by two great cylindrical towers with diameters of 50.9 ft. outside. These two towers are solid for the height of the batter, consequently being able to defy sap, and contain three stories intended for provisions and habitation, with an upper story of very important defenses, crowned by a double parapet. [2]

Note 1.p.149. Art Chateau, Fig. 7.

Note 1.p.150. Arts. Chateau, Fig. 24; Donjon, Figs. 41 to 44.

Note 2.p.150. These two towers were overthrown by mining. T Their fragments in enormous masses lie on the ground; by the aid of these ruins, those works have been restored. The heights of the stories were further indicated by gains on the remaining adjacent buildings.

Of the two towers, nearly similar in their internal arrangement, we give that of the angle, called tower of Charlemagne. [3] At the level of the court of the castle, it contains a vaulted cellar lighted by two slots (Fig. 55, 7). A passage B allows communication from the lower hall of the keep to that cellar. By the stairs C one ascends to the screw stairs, that serves all the stories of the watch-tower. At E is a pit made beneath the wardrobes adjoinin this tower. Above the cellar A is a hall with segmental cross vault, that is on a level with the second story of the residence, and whose plan is similar to that of the hall G of the second story, which hall is likewise covered py a cross vault, and finds itself on a level with the third story of the residence. These hexagonal rooms are each lighted by three windows, having a fireplace K and a passage I communicating with the wardrobes M. At O is the court of the

provisions.[4] The stairs of the watch-tower N connects this p passage N and consequently the hall G with the defensive gallery P of the wall guarding the court for provisions, that itself communicates with the upper defenses of the castle.

3.p.150. Each of the eight towers of the castle of Pierrefonds bears the name of the knight, whose statue is placed on the external surface. The statue of Charlemagne fills the niche at the top of the cylinder of the corner tower of the keep. (See Notice sur le chateau imperiale de Pierrefonde. 4 th edition).

Note 4.p.150. Art. Donjon, Figs. 41, 42, 43.

Above this vaulted hall G is the story especially reserved for the defense, and whose plan we have drawn (Fig. 56). One a ascends to that story by the screw stairs. A first door L gives access on the level to the area S posed on the vault of the hall of the third story. A second door pierced at the level of the upper revolution of the screw gives access to the defensive g gallery R of the machicolations. Arches pierced in the cylindrical wall with steps like the seats of an amphitheatre, afford access from the defensive gallery R to the area S placed 9.8 ft. higher. The screw stairs allows one to reach over this hall a circular balcony with a view of the exterior by a great number of embrasures.

The section made on a b (Fig. 57) explains the importance of that story from the point of view of the defense. On the area A were collected the projectiles suitable for dropping through the machicolations round stones and boulders of all sizes up to 1.3 ft. diameter, since the holes in the machicolations are about 1.38 ft. That heap of projectiles at need could reach the level of the defensive gallery B, leaving an opening at the m middle for the service anf for the passage of men by the door C. The men serving the machicolations stood in the defensive gallery B, as well as the crossbow men. Laborers passed the projectiles to the men according to the orders given by the captain of the tower, who was posted on the balcony D next above. Thus by the openings, from the balcony the captain saw the entire exterior, and the men posted in the gallery and those charged with the projectiles did not have to seek the movements of the enemy, bu only to execute the orders given to them. The crenelated upper story E was also manned by crossbow men charged w with the dominant and distant fire. According as the besieger

came toward a point, the captain caused projectiles to be accumulated at that point without causeng confusion. If the assailant approached the batter of the tower, the men saw him through the holes of the machicolations, and only had to drop boulders to crush him. The fire through the open embrasures E could only be distant, or at most at an angle of 60°, because of the profile produled by the section of the gallery. The fire through the embrasures of the balcony D was either parabolic, or at an angle of 30° and 60°. It was the same for the fire of the cross-bow men posted on the defensive gallery B. Then by the machicolations was obtained a very plunging fire and the vertical fall of projectiles, which bouncing on the batter hit the assailants obliquely. Thus within a radius of 492 to 656 ft., the defenders could cover the ground with an innumerable number of bolts, arrows and stones. The summit of the watch-tower exceeded by several yards the top of the roof of the tower, and its screw stairs had an open newel to allow the watchman to cause the men posted in the defensive galleries to hear, just as if he spoke through a tube.

At G is traced the section through the middle of the sides of the internal hexagon, i.e., through the axes of the windows.

This is one of the last works slightly preceding the regular use of cannon, since the castle of Pierrefonds was terminated in 1407; thus those beautiful towers erected according to the old perfected defensive system were very soon reinforced by advanced earthworks suitable to receive cannon. At Pierrefonds as around other strong places at the beginning of the 15 th c century, one finds important and numerous traces of those advanced defenses built at the time when the besiegers grought cannon with them. The platform preceding these towers next the p plateau is arranged to be able to place in battery mortars or culverins.

The celebrated tower of Montlhery on the old road from Paris to Orleans, is both a fort-keep and a watch-tower. What is now termed the castle of Montlhery is merely the keep, properly speaking, located at the highest point of the hill. The castle consisted of several enclosures arranged in terraces above each other, and containing buildings whose traces are scarcely discovered today. Each terrace was more than 100 ft. long, and only after having successively ascended all of them, one reached

the keep with the form of an elongated pentagon (Fig. 58). When one had ascended the terraces, he found himself before the entrance A of the keep, whose construction belongs to the first half of the 13 th century.

Of the castle where Louis the Younger resided in 1144, there perhaps remain the substructures, but all the still visible portions of the keep , and notably the principal tower, fort and watch-tower, do not date earlier than 1220, although it generally passes for having been erected by Thibaut, forester of king Robert at the beginning of the 11 th century.

This tower B is larger and higher than the four others that flank the keep, and had 32.3 ft. diameter above the batter; t the level of its platform was about 114.8 ft. above the sill of the doorway of the keep. Its plan presents a curious peculiarity. An elevated postern was closed by a portcullis and opens outside independently of the door opening in the court. Two s stories were vaulted, the three upper ones being covered by floors. A series of corbels like those of the keep of Coucy received wooden galleries in two stories; a door also opened on the defensive gallery from the curtain c. This entrance passed through the hall of a screw stairs inscribed within a cylindrical turret, and left the level of this defensive gallery to r reach all the upper stories. From the ground story one ascended to the second story by a stairs within the thickness of the w wall next the inside. At D existed a quite large residence building, whose foundations alone are to be seen today. It is k known what an important part was played by the castle of Montlhery during the middle ages.

This value was due more to its strategic position than to the strength of its works; and the great tower B of the keep was m much more a point of observation than a defense. It is evident that for the garrison of Montlhery, the essential thing was to be warned in time, for thus it became impossible for the assailants to reach the elevated hill on which were placed the defenses; a few men sufficed to baffle a sudden attack.

TOURS DE GUET. Watch-Towers.

Castles and keeps had their watch-towers, and also cities. In the present state of Europe one cannot comprehend the importance of those elevated lookouts on the highest points of castles and cities.

If we have still retained the thieves that seek to enter by night houses in city and country, at least that guild only executes its projects by concealing themselves as best they can. But it was not so from the Roman empire until the 17 th century. During the administration of the last emperors, the villas and even the market towns were not always protected from bands of adventurers, who in broad daylight held to ransom private men and even little communes, as we still see done sometimes in Italy, Sicily, and on a part of the territory of Asia. Brigandage (to employ a term that only dates from the 15 th century) existed in a permanent condition under the Roman empire, even at the gates of the capital of the empire, and it is not equitable to carry back that institution only to the middle ages; it belongs somewhat to all times, and particularly to societies inclining toward dissolution. The feudal middle ages did not practise brigandage, and did not elevate to the height of an institution, as some feign to believe in order to demonstrate to us that the history of civilization only dates from the 16 th century.

On the contrary, feudalism undertook to destroy brigandage, which after the fall of the Roman empire passed into a custom, and extended itself at its ease over all western Europe. Feudalism was a true constabulary, an armed magistracy, and in spite of all abuses surrounding its reign, at least it had the advantage of arousing the people from the weakness into which they fell at the end of the empire and under the Merovingians. Those first possessors of lands, those vassals, knew how to group around their domains the terrified inhabitants of the country, and if the Roman colonists did not become citizens at once (an impossible task, since modern times have scarcely been able to accomplish it), at least they taught them by example to defend themselves and to unite at need under the shadow of the keep against the common enemy. That the castellans stole the great roads could be presented, particularly in the decline of feudalism; but it would also be unjust to make the feudal institution responsible for these crimes, just as it would be senseless to condemn institutions of credit, because one sometimes finds bankrupts among financiers. The Assizes of Jerusalem, that code elaborated by feudalism out of whole cloth, for the state of society of the time, is a collection of very wise ordi-

ordinances, and that indicates a very correct appreciation of the conditions of the social order; and the barons, soldiers and civilians that edited that code, would have been greatly surprised if someone had told them, that an age like oun own, which claims to enlighten all things, would regard them as robbers of pilgrims, toopers, pillagers without shame.

The watch-tower or turret is the visible sign of the system of armed police established by feaudalism. The watch turrets of the castle have not only as their object to warn the garrison of a suspicious approach, but much rather to warn the people of the market town or village to suspect a surprise, and to caution them against a possible attack. It was not rare to see a troop of partisans profit by the hour when the men were in the fields to take possession of a market town and hold it to ransom. At the first alarm the castellan and his men had soon raised the drawbridge and sheltered themselves from insults; b but these garrisons were very weak in ordinary times, and were unable to dislodge the troops of adventurers and prevent pillage of a market town; it was necessary to have time to collect the peasants in the country; for that purpose were erected.wat watch-towers. At the first sound of the horn, at the first rings from the belfry, the rural people assembled under the walls of the castle and organized the defense, relying on the garrison of the fortress. For the same motive, cities possessed watch-towers on points that viewed the country afar. These watch-towers established along the ramparts became the belfry of the c city about the 14 th century: beside the watchmen, they contained bells, whose ringing called the inhabitants to quarters designated in advance, where the local officers directed them according to the instructions transmitted to them by the military chiefs.

In the castles, the watch-towers not only served to prevent the danger of a surprise; the watchmen that were at the top n night and day, warned the men of the castle of the return of t the master, the hours of meals, the rising and setting of the sun, fires kindled in the country, the arrival of visitors, o passengers and convoys. Thus the watch was the voice of the castle and its warning; hence the duty of watchmen was entrusted only to trusty and well paid men, for the work was hard.

Frequently the watch-towers were only watch-turrets, i.e.,

turrets on a principal tower and exceeding in height its top. [1] But there also exist actual watch-towers, devoted only to that purpose.

Note 1.p.157. Art. construction, Fig. 154; also Art. Echaug-uette. The two outer towers of the keep of Pierrefonds each p possessed a watch-turret. (See the preceding Fig.).

The city of Carcassonne possesses a very high one of an early epoch (end of 11 th century), entirely preserved. This tower belongs to the castle and dominates the entire city and the co course of the Aude; it is built on a rectangular plan, [1] and contains only a wooden stairs with landings. Its top could be equipped with wooden galleries. [2]

Note 1.p.158. A legend claims that it saluted Charlemagne on his crossing to Carcassonne; but did Charlemagne ever pass by Carcassonne? Then the tower is only of the 11 th century.

Note 2.p.158. Art. Architectural militaire, Fig. 12, plan of the castle of Carcassonne (the watch-tower is at S); Fig. 13, a perspective view of this castle. Also see Archives des monuments historiques. Gide. editor.

The southwest angle of the Roman walls of the city of Autun, the culminating point of the enclosure, possesses a watch-tower of the 12 th century, of which we give a view (Fig. 69) taken outside the walls. This tower contains several rooms over each other and a wooden stairs. The twin windows of the upper room open on the side next the city. The crowning cornice forms a p parapet, and gutter of the carpentry roof, with the defensive gallery. The water from this flat roof below the parapet is discharged by gargoyles. [3]

Note 3.p.158. This tower is now called the tower of Francis I.

The tower of Nesle at Paris on the left bank, and that controls the course of the Seine at its exit from the city, was rather a watch-tower than a work suited for defense. It was connected by a stockade with the tower on the right bank (called the tower forming the angle), that below the Louvre terminates the wall of the city. A lantern was suspended from its battlements to indicate to boatmen the entrance of the stockade that barred a large part of the river. From its platform was seen the wall on the west (left bank), the suburb of S. Germain, Pre-au-Clercs, the Louvre and the island.

The tower of Nesle was built under the reign of Philip Aug-

August at the same time as the wall of Paris, i.e., about 1200, and is designated in a document of 1210 "Torrella Philippi Hamelini supra Sequanam." [4] Only a century later was it known by the name of tower of Nesle. It was located at the place that the eastern pavilion of the Institute now occupies. On the quay near it opened the city gate called gate Nesle (see plan, Fig. 60), and at A extended a mansion of the same name. The tower of Nelse D of 32.0 ft. diameter had two vaulted stories and t two stories with wooden ceilings, with a platform reached by a screw stairs E, after serving all the stories. This stairs rose above the level of the platform (that perhaps was primitively covered by a conical roof), and served as a watch-turret.

Note 4.p.158. See Diss.archaeol. sur les anc. encl. de Paris, by Bonnardot, Parisien. 1852. See the plans of Gomboust, and of Fer, Merian, the tapestry of the city hall, the engravings of Callot and of Israel Sylvestre, the drawings of Le Vau (Archives de l'empire). This tower was only demolished at the time when was commenced the palace des Quatre Nations (the present Institute), about 1660.

The perspective view of this tower (Fig. 61), taken from outside the gate Nesle, [1] illustrates its value as a post of observation on the river. There could be transmitted signals to the Louvre and conversely, to the entire western front of the ramparts on the left bank [2] and to the palace on the island. Above Paris were two other towers that barred the river; one was called tower Barbeau and formed the head of the rampart on the r right bank; the other was called the Tournelle and had the same purpose on the left bank. The two works were opposite the middle of the island S. Louis, and were connected with two other high towers built on the hills of that island, then intersected by a ditch filled by the Seine. [3]

Note 1.p.160. According to the documents cited above.

Note 2.p.160. These ramparts followed the direction of the p present Rue Mazarine, that was built ou side the city after the 16 th century and was called Rue des fosses de Nesle, because it was built on the counterscarp of those ditches.

Note 3.p.160. Art. Architecture militaire, Fig. 18.

The tower of Villeneuve-lez-Avignon, built on the right bank of the Rhone at the end of the bridge of S. Benezet by Philip the Fair in 1307, as an observation tower at the same time as a

keep suitable for defense. It is connected with a vast system of fortifications that defended on that side the French territory against the encroachments of Provence,[4] and that later c contributed to take from the Popes of Avignon all feudal rights over the course of the Rhone.

Note 4.p.160. See in Art. Pont the history of the construction of this tower and Fig. 2.

This tower was built with four sides in lozenge plan, and o possesses several vaulted halls and a square watch turret at top, with a turret also suitable to receive a sentinel. It is an admirably constructed work with platform, battlements with machicolations, and watch turrets at the angles. This kind of defense brings us to speak of towers regarded as isolated posts, a sort of permanent blockhouse.

TOURS-POSTES ISOLEES. TOURS DEFENSES DE PASSAGES, DE PONTS.

Isolated Tower-Posts. Defensive Towers of Passes and of Bridges.

The courses of our rivers, the passes of the mountains, certain lines of defense of a territory, yet allow to be seen traces of towers, habitually square, that served to ensure the tolls on the rivers and to repress brigandage, arrest invasions, and surprises by too powerful or turbulent neighbors. These tc towers are still found in great numbers in the passes of the Pyrenees, along the upper Loire, the Rhone, Saone, Aveyron and Tarn, Doubs and Isere, on the frontiers of Morvan, and in the Vosges, are located on high points and can correspond by means of signals. The selected site is habitually a steep point only connected with the adjacent heights by a tongue of land, so as to be accessible only a one point. This natural road is sometimes cut by a ditch or defended by a rampart serving as a curtain for the tower. One can enter the latter only by a door e elevated above the ground, and by a ladder or a movable bridge resting on the defensive gallery of the curtain. A typical example will illustrate this arrangement frequently adopted in t the passes of the Pyrenees (Fig. 62). Before the gate of the curtain was placed a barrier of wood. A machicolation defended this first gate. To penetrate into the tower-post one ascended a flight of steps leading to the defensive gallery of the curtain. This gallery extended to the side of the front of the tower in which was pierced the door. A movable bridge dropped

on a corbel on the defensive gallery by means of a windlass p placed in the machicolation of the watch, and allowed one to e enter this fort containing several stories and an upper platform intended for defense and for signals. These posts are often furnished with fireplaces and with an oven and a well reaching a spring, or with a cistern excavated in the rock and collecting rainwater from the platform and the area.

The Templar knights possesses many of these posts established on a great scale in Syria. "The various war stations possessed by the Christians in the middle ages in the hold land were connected together by little posts or elevated towers on a uniform plan; a great number still remain today, viz:- Bord-ez-Zara, Bordj-Maksour, Om-el-Maasch, Ain-el-Arab, Miar, Tokle,etc."[1]

Note 1.p.162. See Essai sur le dom.franc.en Syrieet l'Orient. by G. E. Rey. 1866.

These tower-posts built by the knights of the Timple in Syria and the East are rectangular in plan. M. G. Rey, from whom wi borrow the data concerning those of Syria, gives plans and a section of one of these towers, that of Tokle, that we reproduce here from him (Fig. 63). One enters the lower hall by the gate A. At the middle of this hall is excavated a cistern. To seek the door opening to the straight stairs ascending to the upper stories, it is necessary to reach the floor B by means of a ladder. A tunnel vault forms the second story and a cross v vault without ribs supports that upper platform; a second floor divides this third story into two, to reserve a storeroom for provisions beneath the platform. A machicolation commands the door. The ground story could serve as a stable for several h horses.

It is interesting to find at Paris a tower built by the knights of the Temple, and that presents an arrangement analogous to those found in Syria in the posts of that military order. This defense was placed opposite the existing College of France, and was known under the name of tower Bichat, because the celebrated professor gave his lectures there. [1] It belonged to the commandery of S. John of Jerusalem, which later in the 16 th century took the name of S. John Lateran. "The principal entrance od the commandery opened," says Baron de Guilhermy,[1] "opposite the College of France. The most notable buildings in the enclosure were the tithe barn, the house of the commander,

the tower, church and cloister. We think that this tower was the keep of the commandery, the depository of documents, arms and precious articles, the place of assembly of the knights, the sign of the soverignty of the commander over the fiefs b belonging to S. John."

Note 1.p.164. It would have been easy to preserve this precious monument, that did not seriously interfere with the course of the new streets in this part of Paris. It was a very curious example of the works due to the Templars at about the end of t the 12 th century. In spite of the protests of the most authoritative persons, the demolition of tower Bichat was hastily decided, and we scarcely had time to measure that edifice. Some capitals from that demolition were transferred to the museum of Cluny, but this was not by its sculpture, although beautiful, that this edifice interested the historian.

Note 1.p.165. See the excellent Itinerarie archaeologique de Paris by the learned author of so many precious works on our n national antiquities. Like all those that have the same care for our historical monuments, M. de Guilhermy deplored in 1855 the destrocution of the tower Bichat. "The city of Paris," said he, "that has made so many generous sacrifices to save the tower of S. Jacques la Boucherie, on the contrary showed itself for that of Latran, and yet if the first enjoyed a greater fame, the other belonged to a better epoch of art, and was connected with a group of edifices of a more interesting character." We shal add that the tower of Latran was the only monument of the kind in France."

The tower of the commandery of S. John of Jerusalem, built on a rectangular plan, was joined to the residence of the commander by one of its angles; by another it was connected with the curtain. This commandery having been transformed at several times, it became difficult to recognize accurately what was the position of the tower in relation to the buildings of the same epoch. Yet Gomboust's plan shows it as facing the outside on t the western front, and in fact its principal defenses were presented on that side. Further, measurements made of it taught us more than could the documents furnished by the old plans of Paris. Here then at A (Fig. 64) is the plan of the ground story of the tower. This ground story consisted of a hall in two bays with cross vaults, with a low postern a that formerly opened on

the external ditches; a door b likewise opened on the stairs, and allowed one to reach the level of the court by passing o over a movable bridge g, for the internal ditch f was extended by a redan to that stairs. D was then the ditch enclosing the commandery; f being the special ditch of the tower. The lower hall had no communication with the upper stories. To reach the second story B, it was necessary to ascend by the stairs C attached to the western curtain. This second story did not communicate with the house of the commander located at H; it was n necessary to follow the stairs C to attain the level of the t third story E. From that hall one could enter the commander's residence by the door e pierced in a cut-off angle. Also by t the stairs C one ascended to the platform G, covered by a hip roof. That stairs C was of wood, enclosed in a structure with thin stone walls. From the house of the commander at the middle of the second story it communicated by a crenelated gallery T (see plan k) with the defensive gallery of the curtain. A longitudinal section made on m n will more clearly explain these arrangements (Fig. 65). A is the bottom of the ditch, whose counterscarp does not appear to have exceeded the level B. At C is found the door that gives entrance to the stairway. At D slots are pierced at the backs of three recesses made in the wall of the second story. At F is the crenelated passage communicating at the middle of the story from the house of the commander to the western curtain. The lower hall was lighted only by high air holes; as for the two vaulted halls above, numerous windows allowed the light to enter. The upper embrasures were closed by wooden shutters entering rebates. Fig. 66 presents the section through the hall of the second story on the side of the defense. Three niches are seen at the back of the hall. Before the middle one is placed a double column that supports the two discharging arches on which rests the upper wall. (See plan B and the longitudinal section). For one will note, that to give more stability to the construction and to support the pressures toward the interior, the walls recede inside to the side arches of the vaults. From the exterior of the commandery, the tower had a severe appearance. We give a view of it (Fig. 67) with the curtain , the enclosure of the stairs and a part of the residence of the commander.

This structure of small masonry was well treated and had

suffered no alterations other than those caused by the vicinity of modern structures abutting against its sides. The vaults of the halls were in good condition, and the restoration of this curious specimen of a tower of a commandery would have been neither difficult nor expensive.

The tower of the Temple at Paris ~~dated from~~ the end of the 13 th century and was completed in 1306, a little before the dissolution of the orders. [1] This tower was on a square plan with four turrets at the angles ascending from the ground. It served as treasury for deposits and documents, and as prison, like most of these Noeos belonging to the establishments of the knights of the Temple. This edifice was destroyed in 1805.

Note 1.p.170. Art. Temple.

We still possess at Paris one of those works serving as a retreat, treasury, place of safety, in mansions possessed by princes in the midst of cities; it is the tower still seen in Rue de Petit-Lion, and that belonged to the mansion of the dukes of Burgundy. "The edifice," says our learned friend Baron de Guilhermy, [2]"is solidly built of stone carefully dressed; it is pierced by pointed openings and crowned by machicolations. a broad screw stairs ascends to the upper story containing a beautiful hall with cross vault. The windows lighting the stairs are rectangular and are decorated by mouldings. The steps turn around a column, which terminates in a very simple capital; but this capital serves as a support for a cylindrical drum, from which spring vigorous stems representing oak branches, whose interlacings form the ribs of four groined vaults, and whose leaves are detached and project from the masonry fillings." A secret chamber is arranged at the top of the tower and can be isolated from the passages by means of a pivoted shutter.

Note 2.p.170. Itiner. archaeol. de Paris. p. 279.

The tower was built by duke Jean-sans-peur (John the Fearless) in the first years of the 15 th century. That prince inhabited this mansion when he caused the assassination of Louis of Orleans in Rue Barbette. The mansion of Jacques Coeur at Bourges also possessed its tower, fort and treasury, whose principal room on the level of the second story was closed by an iron door. [3]

Note 3.p.170. See Art. Maison, Fig. 4, the plan.

We cannot pass gate towers in silence. Frequently the secondary

gates or even posterns were pierced through the towers instead of being flanked by them. That arrangement scarcely appeared before the end of the 13 th century, and it is pretty rare. A Again in the city of Carcassonne do we find one of the most re remarkable examples of this sort of works. On the south front of the second enclosure rises a high square tower with four t turrets rising from the ground, that externally show no doorway, but at one of its sides (that on the east) opens a door or rather a wide postern, whose sill is placed 6.6 ft. above the external soil. Fig. 68 presents the plan of this tower at the level of the ground story. To reach the sill A it was necessary to place outside a ladder or inclined plane of wood. This first entrance is defended by a machicolation a, a portcullis b and doors c. Thus one enters beneath the vault pierced by a square opening at the centre; then it is necessary to turn to the right, and he finds himself before the second door, also d defended by a machicolation d, a portcullis f and doors g. Passing this second door, he is in the city.[1] The curtains of t the walls are at B and C. The two doors h and i open into a passage that communicates with a screw stairs ascending to the w watch-turret l and to the upper stories. The second story (Fig. 69) shows at o the external machicolation, that is served over the portcullis p, when that is lowered; the second machicolation g and the second portcullis are served by the passage t. T The hall of the second story contains a fireplace k with oven, three cupboards s, and a well v, that also has an opening on the lists. Two windows f light the room. The screw stairs ascends above this hall to a first battlement enclosing a second hall with tunnel vault, crowned by a platform suitable to receive a machine with long range.

Note 1.p.171. See the general plan of the city. This note is that of E. Mozoire. (Art. Architecture militaire, Fig. 11 et 3).

Fig. 70 gives the appearance of the tower on the side next the city.

One will observe that this tower interrupts the defensive gallery of the curtains, over which it also exerts a considerable command. A broad straight stairs placed on arches (see at I, Fig. 68) reaches the level of one of the defensive galleries a and ends oppositi a door opening on the screw stairs. The slope of the ground inside inclining toward the entrance, a gardevil-

is pierced at G about 6.6 ft. above the ground of the lists, a and at need this could serve as a speaking tobe for the returning patrols. This work belongs to the defenses added to the city of Carcassonne by Philip the Bold, and is built like the tower of the bishop's palace on courses of hard sandstone with bosses, jointed with care. It dominates the barbican of the outer wall and the entire vicinity, for it is placed on the highest point of the plateau. Its mass serves to mask the church of S. Nazaire, only distant 82 ft. Its platform is covered by stone slabs, and a watch-turret H (Fig. 70) surmounts it, to allow the master engineer to direct the working[1] of the great machine placed in battery on that platform.

Note 1.p.172. The stone-thrower is represented in battery on that platform.

Outside, the tower of the postern of S. Nazaire presents an appearance still more imposing, for the ground of the lists is 9.8 ft. below the sill of the second door. Fig. 71 shows this exterior next the side of the postern, the wooden galleries being assumed set in place for the defense. These galleries are placed on but three sides of the tower, before the parapet of the defensive galleries, leaving the watch-turrets free and their slots; so that these turrets flank the wooden galleries and are arranged as indicated by the section (Fig. 71 bis).

According to custom, the communication between the ordinary defensive gallery A and the defensive gallery B for war consists in the embrasures pierced in the parapet. From this gallery B by the end of the miller's ladder the crossbow men ascended to the raised gallery C and could shoot bolts through the machicolation D. Three rows of crossbow men thus firing simultaneously. Further, projectiles were dropped vertically at need through the machicolations V.

Profiting by the command from the upper platform, a fourth row of crossbow men shot bolts afar through the openings with shutters and the slots pierced in the parapet Fa Dotted lines indicate the angles of fire.

Sometimes the arrangement of gate towers was adopted for sake of economy. It was less expensive to make an opening in the base of the tower, than to flank that opening by two towers according to the most general custom. Several of the blockhouses built in Guyenne under English domination have square towers

for gates. One finds even before that epoch in the country traces of gates pierced through square or rectangular works. Such is gate Brunet at S. Emilion, whose construction is still intirely Romanesque, although it scarcely dates before the beginning of the 13 th century. One of the gates of Cadillac offers a curious arrangement, among the works of that kind. It was only in 1315 that the enclosure of the blockhouse of Cadillac and its portals were commenced. [1] The inhabitants must erect the walls, and the lord of the place, Pierre de of Grailly, the four good and sufficient portals. It seems that these four portals, the lord of Grailly built only two. Here is one of those, called gate Garonne, constructed with the greatest economy, but presenting an arrangement little known.

Note 1.p.176. See Guyenne militoire, by M. Leo Drouyn. Vol.II. p. 255. Also see in the some work the gote of S. Mocoire, colled gote Codilloc, thot is rectongulor in plon ond crowned by o simple row of mochicolotions.

Ditches about 77 ft. wide and filled with water from the Oeulle surround the old fort. Gate Garonne projects its entire depth outside the curtain, whose defensive gallery continues behind it, and it sweeps the ditch. Here (Fig. 72) is the plan of that gate at the level of the ground story at A, and at B is on the level of the second story. In the last plan is seen at a the defensive gallery of the curtain, that the work does not interrupt. The machicolations and slots b are pierced 6.6 ft. above the floor of this defensive gallery, and consequently cannot be served by men posted in that gallery, but indeed by soldiers placed on a wooden floor seen at d in the longitudinal section (Fig. 73); now one can only reach that floor by passing through a door opened at e on the level of the second story (see plan B), and can only ascend to that floor by a movable ladder drawn at f (Fig. 73), and that starts from the floor of the gate. The guards of the door then have the sole charge of watching over its defense, and do not communicate with the defensive gallery of the curtains. Since according to the charter establishing the defenses of Cadillac, the inhabitants built the walls and the lord erected the gates, it might be that the guard of the latter was only confided to the men of the lord of Grailly. They alone could open the gates and alone could defend them. The lord would thus have less to fear the consequences of weak-

weakness, discouragement, or even negligence of the citizens, sufficiently disposed at all times not to brave the length of privations of a siege.

To have an understanding with enemies and aid them by means of passing a moat 66 ft. wide and filled with water, and to s scale a rampart 33 ft. high, was an act of treason that brave men could not perform; but to allow the post of a gate to be surprised, or to listen to proposals, and consent to lower the drawbridge before a troop making fine promises, was what frequently happened to soldiers.

It seems that the builder of gate Garonne of Cadillac may h have desired to avoid this danger by making this defense, in spite of its small importance, a post absolutely independent of the ramparts of the city. In our longitudinal section (Fig. 73) it is seen that the defensive gallery is easily overlooked by a man posted on the floor d. The place of the movable latter allowing one to reach the door e (plan 72 B and section 73) is s still perfectly visible. The pier p is wider than the pier g. Then the machicolations and slots commence only after the door e. (See transverse section, Fig. 74). The protecting wall of these slots is borne on two corbels and an arch, thus leaving a space between it and the side wall g; a space which the ladder fits. That was in two parts; a side anf upper part was fixed, set on a rest arranged on the corbel beside the guard wall; the other followed the wall g to the ground. The second part of the ladder f (section, Fig. 73) slid at need on the timber i fastened to the wall, and on the other side l was held by the timber m resting on the corbel s. But the door e and the help of a rope, it was easy to slide the descending ladder on the sides of the fixed ladder . It is understood that a guide prevented that descending ladder from leaving its plane.

The men of the post having ascended the ladder, passed through the door e and descended by the little ladder to the special defensive gallery d. Thence through three slots they could shoot bolts at the first gate and serve the machicolations, if the enemy reached the gate barrier t. A small drawbridge 7 closed the first gate. The defensive gallery d was covered by a simple and very steep shed roof r. Also by the ladders one ascended to the second story of the upper defense, consisting of battlements and pierced by slots with machicolations on the front and

weakness, discouragement, or even negligence of the citizens, sufficiently disposed at all times not to brave the length of privations of a siege.

To have an understanding with enemies and aid them by means of passing a moat 66 ft. wide and filled with water, and to s scale a rampart 33 ft. high, was an act of treason that brave men could not perform; but to allow the post of a gate to be surprised, or to listen to proposals, and consent to lower the drawbridge before a troop making fine promises, was what frequently happened to soldiers.

It seems that the builder of gate Garonne of cadillac may h have desired to avoid this danger by making this defense, in spite of its small importance, a post absolutely independent of the ramparts of the city. In our longitudinal section (Fig. 73) it is seen that the defensive gallery is easily overlooked by a man posted on the floor d. The place of the movable latter allowing one to reach the door e (plan 72 B and section 73) is s still perfectly visible. The pier p is wider than the pier g. Then the machicolations and slots commence only after the door e. (See transverse section, Fig. 74). The protecting wall of these slots is borne on two corbels and an arch, thus leaving a space between it and the side wall g; a space which the ladder fits. That was in two parts; a side anf upper part was fixed, set on a rest arranged on the corbel beside the guard wall; the other followed the wall g to the ground. The second part of the ladder f (section, Fig. 73) slid at need on the timber i fastened to the wall, and on the other side l was held by the timber m resting on the corbel s. But the door e and the help of a rope, it was easy to slide the descending ladder on the sides of the fixed ladder . It is understood that a guide prevented that descending ladder from leaving its plane.

The men of the post having ascended the ladder, passed through the door e and descended by the little ladder to the special defensive gallery d. Thence through three slots they could shoot bolts at the first gate and serve the machicolations, if the e enemy reached the gate barrier t. A small drawbridge 7 closed the first gate. The defensive gallery d was covered by a simple e and very steep shed roof r. Also by the ladders one ascended to the second story of the upper defense, consisting of battlements and pierced by slots with machicolations on the fron. and

sides of the tower. If we assume that the section made from x to y (plan B) looking toward the interior of the tower, we obtain Fig. 75. This drawing shows us the arch of the door at e, the floor of the defensive gallery of the curtains for the service of the soldiers at b, and the defensive gallery of the post especially for the guard of the tower at e, with its door e o opening on the movable ladder. [1]

Note 1.p.180. The very complete drawings of this work have b been furnished to us by M. Durand, architect at Bordeaux.

Still these square towers serving as gates do not appear to offer sufficient resistance to a determined assailant; their fronts were not flanked, and the serious defense commenced only in even the interior of the tower, when the outer gate was already taken. There was an inconvenience in that method. In the matter of fortifications, it has always been bad to reserve the most efficient means behind, for the troops are then disposed to abandon readily the external defenses to take refuge in those that they regard as stronger, but which are the last, and which thus arouse the energetic efforts of the assailants. A place encroached on as soon as taken, the besiegers becoming t the more energetic and bold, when he has obtained a first advantage. It is an axiom of defense, that has never ceased to be a applicable:- it is easier to prevent an assailant from advancing, than it is to drive him back when he has gained a post.

A gate not flanked, like that of the fort of Cadillac, was soon forced by filling the ditch. Then the besiegers found t themselves in front of a second defense, it is true, relatively strong and well equipped; but it was eary for them to set f fire to the floors of the tower by piling fascines under the p passage, and in that case the work had no more value. At the end of the 14 th century however, the towers assumed new importance because of their command, [1] and a celebrated soldier, Olivier de Clisson, continued to employ them as gates. Yet Olivier de Clisson renounced the square plan and adopted the cylindrical form. The castle of Blain, situated between Redon and Nantes, was built at the end of the 14 th century by the constable Olivier de Clisson. The entrance gate of the bailey is placed in a round tower, called tower of the drawbridge, that still shows on the exterior and interior the crowned V with a helmet. This monogram is equivalent to a certain date, for one

finds ot on the seal of Olivier de Clisson of 1407, and on the buildings of the mansion of the constable built in Paris about 1388, now comprised in the palace of the archives of the empire.[2] It is further known that about 1366, Olivier de Clisson, who h had sworn never no have the English for neighbors, demolished the castle of Gavre that the duke of Brittany had just given to Jean Chandos, and he had the stones taken to Plain to use them in the construction of a new castle. Now it appears that the ferocious constable had adopted in the defenses that he er erected, a system of gates passing through the cylinder of a round tower, with drawbridge, long passage, folding doors, machicolations and portcullises.[3]

Note 1.p.181. Thus we have explained concerning one of the towers of the castle of Vincennes. The gates of that castle are pierced in the tower on rectangular plan and analogous to that represented in Figs. 31, 32.

Note 2.p.181. noto taken from an unpublished Note of M. Alfred Rome.

Note 3.p.181. On this programme was constructed the gate of the bailey of the castle of Plain just mentioned.

The round tower had this advantage over the square tower, t that it threw divergent projectiles, left no dead points under the machicolations, and was difficult to attack by mining.

These gate towers of Olivier de Clisson had a considerable command over the curtains. That of Plain is covered by a conical roof, and over the vaulted passage of the gate is a square hall with fireplace, closets and a stairs ascending to the defensive galleries of the machicolations.

The celbrated castle of Montargis possessed a gate tower constructed nearly according to this programme, but developed. We present its plans (Fig. 76).[1] At A is traced the plan of the ground story. A drawbridge was lowered at a on a road; b was a wide ditch; d, the isolated curtain of the tower; e, the great hall with battlements;[2] f, the second drawbridge, so that the tower could be entirely isolated from the outside and from the court g of the castle.

Note 1.p.182. See Du Cerceau, Les plus excellens bastiments de France.

Note 2.p.182. Article Halle.

When one had passed the first gate a, he found himself in a

cylindrical court, a sort of well open to the sky with no exit other than the gate f of the court. In the second story B the tower communicated with the curtain by means of a wooden foot-bridge landing at a little post h. By two passages reserved in the thickness of the cylinder one reached the two rooms of the portcullises, and found opposite the foot-bridge a screw stairs ascending to the upper storyof the defense, whose plan is represented at C. That story consisted only of an annular gallery with battlements outside and inside, so as to allow the defenders to crush the assailants that had ventured into the circular court.

From the ground one could not ascend to the upper stories. Small posts were probably arranged in the thickness of the cylinder between the rooms of the portcullisses and the crowning gallery. Fig. 77 presents the section of this tower, made on the axes of the gates a A, and the detail of the upper gallery at B. We cannot state whether this work was earlier or later than the defenses built in the West under the orders of the constaple de Clisson; but it is certain that it belonged to the s same order of defenses.

We have shown in Art. Pont towers intended to defend passage; some are square, like those of the bridge of Cahors; others are circular or elliptical, like the great tower of the bridge of Saintes. It is then useless to extend farther here on these towers set across passages. It remains for us to say some words on light-towers. One of the oldest is the tower of Aigues-Vorte, called the tower of Constance, built by S. Louis. This cylindrical tower has 91.9 ft. height by 72.2 ft. diameter; a turret of 36 ft. rises on the platform near the battlements, and supports the night fire intended to guide the ships entering the port. That platform is arranged to receive the rainwater, which runs into a cistern. Two vaulted halls are constructed below the b battlements and are only lighted by slots.

On the square tower of fort S. Jean, that flanks the left side of the entrance of the old port of Marseilles, and that dates from the 14 th century, formerly existed a turret supporting a fire. On the shores of the Mediterranean, in the suburbs of A Aigues-Vorts, are still seen traces of isolated towers, that s served both for light-towers and for posts to defend the shore against the descents of pirates.

Most of these works date from the reigns of S. Louis, Philip the Bold and Charles VI.

The destructive climate of the coasts of the ocean has not allowed the light-towers of a remote epoch to remain, and one can regard as one of the earliest the tower of the port of Rochelle, called tower of the lantern. That work is attached to the ramparts and rises on the shore of the sea at about 325 ft. from the mouth of the harbor, at the end of the left front. It is a great tower 52.5 ft. diameter, terminated by a pyramidal stone spire.

We give the plans (Fig. 78) of its three stories, at A being the ground story, at B on the level of the second, and at C on the level of the defensive gallery. [1] The lower story is vaulted; it communicates with the city by the passage a, but is not connected with the upper stories by any stairs. The second story is only entered by the passage b opening on the defensive g gallery of the curtain. From that passage one ascends by a screw stairs to the defensive gallery of the tower with battlements at g; then at this level is found a second stairs h reaching the lantery attached to the spire. Fig. 79 represents the section of the tower. One notes that the defensive gallery is pierced by machicolations. At A is the lantern that receives the fire, which was masked by the spire from certain points of the horizon. It is true that the lantern is at the side next the high sea, and that its fire illuminated the point of the spire, which might be for sailors a means for not confusing this light-tower with another. The construction of this tower dates f from the end of the 14 th century. Fig. 80 presents its elevation on the side next the entrance of the harbor. A balcony is reached by the screw stairs, is placed at the mid-height of the stone spire, and permitted the placing of watchmen or even additional fires.

Note 1.p.184. M. Lisch, architect, who has written a very remarkable work on the port of Rochelle, had the courtesy to permit us to reproduce his drawings of the tower of the lantern.

It has been recognized in our days, that it could not suffice to place lighthouses at the entrance of roadsteads or of rivers to indicate the passage to mariners, but that it is first important to mark the position of the coast. "Now this coast presents a series of capes variously accented, that may be regarded as

the apexes of a polygon enclosing all the reefs; and men have placed a light on each of these so as to indicate the land as far as permitted by the height and the power of the appratus. They have further established such a relation between the distances between the points and the reach of the lights, that it would be impossible to approach the coast without having at l least one light in sight, while the air is not foggy." [1] One w will understand that to execute a work of that nature and according to that method, it is first of all essential to have very accurate maps of the coast. Now topographical science is an entirely modern science.

Note 1.p.187. Memoire sur l'eclairage e le balissage des c cotes de France, 1864, by M. Leonce Reynoud.

Coasts during the middle ages, as well as during the period of Grecian and Roman antiquity were recognized only in an imperfect manner, yet sufficiently that reefs or promontories may have been marked by towers or simple furnaces in which were burned resinous materials during the night.

If one traverses the coasts of France, particularly in Normandy and on the Mediterranean, it is very rare that in the vicinity of modern lighthouses, he does not find traces of structures of the middle ages. During that period as during antiquity, if men communicated by means of signals placed on elevated points while the day lasted, at night fires became a habitual means of communication between distant points, as still practised in the mountains of Switzerland and the Cevennes before the establishment of the electric telegraphs. It is unnecessary to say that these lighthouses supported, either simple gratings f for resin, or permanent fires enclosed in lanterns, and that they could not have the range of our modern apparatus.

The extent that we have been compelled to give this Article sufficiently shows how important were structures with great command in the architecture of the middle ages. This desire or need to erect towers exists in all civilizations, that have not reached complete development. Those that built wished to see and be seen afar. Thus the tower became also a security, a means of oversight and a mark of honor.

Under the feudal system, the lords alone had the right to e erect towers; vassals could not possess them. (Arts. Chateau; Manoir.

It is well understood that abbots exercised the same right, as feudal lords, which both for lay as well as religious lords was subject to authorization by a sovereign. Thus under Philip August and under S. Louis, many a lord was compelled to demolish the towers, that he had built without first having obtained t the royal sanction.

Demolition of towers ordered by the sovereign was almost always caused by the complaints of the neighbors. Notably the a abbots and bishops carefully saw that castles with towers were not erected in their vicinity. Their complaints on this subject are frequent, and when the parties could not agree, it was necessary to resort to the royal authority. Was tha always expected? This is doubtful; hence between the lords the conflicts that in the end caused the royal intervention to the detriment of one of the two adversaries, sometimes of both, and to the benefit of the sovereign power. Besides in case of war or defense of the territory, the king had the right to occupy, or c cause to be occupied by his troops, the castles, towers and ke keeps of his vassals.

Now in spite of this right, it sometimes occurred that the gates of castles remained closed before their sovereign, who was not always in condition to cause them to be opened by force. Thus castles and their formidable towers became for royalty, as they were strengthened, a memorial of insults frequently unpunished. Louis XI struck the first blow at these feudal nests. The Renaissance, even more by feshion than by politics, saw a great number destroyeds Henry IV, Richelieu and Mazarin dismantled the last.

Yet such was their number on French territory, that we find many of these defenses and posts still standing.

TOURELLE. Turret. Small Tower.

Diminutive of tower, a small tower or rather a tower of small diameter. Manor houses could not have towers, but only turrets. (Art. Manoir). The name of turret was also given to actual towers flanking curtains, but whose small perimeter could contain but a very small number of defenders, a sort of watch-tower or turret. Gates of little castles were often furnished only with turrets. Today one habitually designates by this name cylindrical or polygonal works supported on corbels. These turrets rose

either from a corbel or a buttress; they afforded only a flanking of small extent and a view outside the habitation, of a g gate or a curtain. men scarcely began to employ them only during the 12 th century; the 13 th, 14 th, 15 th and 16 th centuries even made great use of them, and certain residences of t the 17 th century still posses them.

Note 1.p.120. Several turrets are still seen on mansions of the 17 th century in Rue Hautefille at Paris.

The turret is closed and communicates with the dwelling or defensive galleries only by a door. Thus it forms internally a little circular room, a cabinet or watch-box, and is most f frequently covered by a cone of stone or of carpentry, lead or slate. The turrets frequently contained a screw stairs communicating from a second story to the upper parts of the edifice. Fig. 1 gives the plan and view of an angle turret of the 12 th century belonging to the oldest part of the castle of Vees. T That turret is cylindrical and is placed on two buttresses, a and three corbels filling the reentrant angles; consequently it was hollow only at the height of the third story. Bands and c chevrons decorate its springing and cornice.

Enclosures of abbeys and small courts were often strengthened by turrets at the angles or at certain distances for placing watchmen. Somemimes even these turrets had two stories, on at the level of the defensive gallery, the other above, to which one ascended by a ladder. [1] This sort of turrets were actual watch-boxes, and were so called during the middle ages. [2] The two cylindrical turrets that flank the gate of the abbey of S. Michel-en-Mer are indeed little towers in the old sense of the word. Here (Fig. 2) is a perspective of that beautiful work b built in alternate courses of rose and of gray granites in the height of the second story, and that dates from about 1260. [3] Those two turrets serve both for stairs and defenses in their upper part. The gate flanked by them is preceded by a little fort, and the entire construction is intact. [4] They are not conical roofs which crown the two cylinders, but platforms, to leave more freedom to the defenders.

Note 1.p.122. Art. Cloture, Fig. 5.

Note 2.p.122. Art. Echauguette.

Note 3.p.122. Art. Architecture monastique, Figs. 18, 19, that give the plans of that gate, at B and C of Fig. 18, and at A of Fig. 19.

Note 4. p.192. In Archives des monuments historiques, see the work of M. Devrez, architect on Mt. S. Michel-en-Mer.

The principal gate of the palace of the Popes at Avignon is likewise flanked by two little towers, whose arrangement merits attention.

This facade consists of a series of arches pierced by machicolations at the height of 49.2 ft. above the ground, and supporting a defensive gallery with buttresses, behind which the facade wall rises to the height of the roof and bears a second series of battlements.[5] The two turrets of the gate rest in h horizontal courses on two piers of the arches forming machicolations, and profit by the projection of the defensive gallery to rise to the upper battlements (Fig. 3): thus they flank the two lower defensive galleries A and B, and add to the defenses of the gate.[6]

Note 5.p.192. Art. Palais, Figs. 15, 16 (14 th century).

Note 6.p.192. The upper part of these turrets was still intact at the beginning of the (19 th) century; the work has been razed to the level of the defensive gallery since then, but there exist drawings and paintings in the library of Avignon, which permit it to be restored completely.

The pyramids crowning these two turrets were of stone and decorated by crockets. One will note that the corbels supporting the are circular in plan, while the turrets themselves are octagonal in plan, with ribs projecting at the angles and at the middle of the sides of the prism. This arrangement is not rare during the 15 th century.

Many mansions and even simple private houses possessed angle turrets, allowing windows to enfilade the streets, or engaged turrets containing stairs. (Art. Maison, Figs. 13, 14, 15, 33, 34, 35, 39). Sometimes thise turrets were also arranged to give little cabinets in the vicinity of occupied rooms. There existed a charming turret of that kind in the angle of the court of the mansion de la Tremoille at Paris; it formed a porch in the ground storybefore the passage leading to the garden.[1]

Note 1.p.194. Art. Maison, Figs. 36, 37. Fragments of that turret were deposited in the court of the Ecole des Beaux Arts in Paris.- Also see Architecture civile et domestique by MM. Verdier & Cattois.

When turrets were corbelled, the constructors of the middle

ages devoted great care to the arrangement of the masonry and the distribution of the loads to avoid overthrow. These corbellings much below the internal floor of the turret, and the cylinder is complete, so as to be able to maintain itself at its centre of gravity. It is quite rare that an angle turret is d drawn as indicated by the plan (Fig. 4, A), i.e., with three-fourths its area outside the lower construction. Most commonly either a buttress relieves a part of the overhang (see B), or more than one-fourth (at C). But the 15 th century allowed itself boldness in construction and loved to show this. Then sometimes at that epoch angle turrets were erected according to s sketch A. Then to prevent overturning the entire portion a b c of the cylinder, it was necessary for the corbel to start sufficiently low as to be loaded by the angle h, before commencing the complete separation of the interior of the turret. The constructors proceeded thus. Let (Fig. 5) a section be made on b h; let g be the level of the floor of the story commencing with the lower floor of the turret. The starting of the corbel being placed at n, low enough that the load of the fourth of the plane n o p q resting on the angle stone is at least equivalent to the load n s t of three-fourths of the projecting corbel. For that purpose there was left at v a vacancy covered by an end of the floor. This open space in old turrets, where it exists, is taken as an intended secret hiding place. 2 The three-foubths of the cylinder overhanging were easily connected to t the fourth engaged at the angle, but still it was essential t that the engaged quarter should by itself be as heavy as the overhanging three-fourths; that is why the walls of corbelled turrets are very thin, frequently perforated, and present a h horizontal section like that traced at D in our Fig. 5.

Note 2.p.194. I have seen a turret ruined where the owner of a manor had the idea of removing the massive angle forming a counterpoise, believing tha this mus enclose a treasure. It would also be very dangerous to fill with masonry the pretended secret places.

TRABES. Beam. Rood Beam.

The Latin word trabes adopted by the Church, signifying the wooden timbers placed across or around the choir, on which were placed lights or lamps were suspended. The abbey churches had

rood beams before the main altar (Art. Choeur). A crucifix was habitually fixed on the middle of the beam. These beams sometimes rested on four columns surrounding the altar. They were carved and painted, or were covered by goldsmith's work in copper or silver, [1] surmounted b: arches in which burned lamps. Sometimes statues decorated them. [2] There no longer exists one of those beams in our old French churches, but some are still seen in the churches of Italy. The little monastic church of S. Jean-au-Bois in the forest of Compeigne still permits to be seen t the two sawed ends of a beam of the 13 th century covered by pretty paintings. Those ends rest on two capitals placed beside the piers at the entrance op the choir (Fig. 1). During the holy week was suspended from the rood beam the funereal veil that concealed the altar of the sanctuary. The custom of the rood beam is earlier than that of the rood screen and dates from the first time of Christianity. Like many other primitive customs, it is retained in the Greek Church, and we cannot state why these beams for supporting lights were suppressed in France. The abbey churches of S. Denis and of Cluny possessed magnificent rood beams ornamented by goldsmith's work and chandeliers of vermilion, which were placed between the stalls and the sanctuary.

Note 1.p.197. See Du Cange. Gloss.

Note 2.p.197. Latin Note.

TRAIT, ART DU. Art of Drawing. Detailing.

Thus is designated the operation, that consists in drawing full size on a surface the horizontal and vertical projections, sections and revolutions of the different parts of a structure, so that the stonecutter can take off templates for the masonry; the carpenter can cut the timbers that compose a work in carpentry, the joiner can obtain the members of the joints of wainscot, doors, windows, etc.

Drawing is an operation of descriptive geometry, a separation of the multiple planes that compose the solids to be placed in the construction.

The art of drawing was developed during Grecian antiquity, b but was nearly ignored by the constructors of the first period of the middle ages, and on seeing the Carlovingian monuments, it does not seem that the efforts attempted by Charlemagne to cause geometry to be taught to western architects produced sa-

sensible results. Only after the first crusades was perceived a notable development of these sciences in France. At the end of the 12 th century, the masters of works had resumed possession of geometry, and since that epoch their skill in that science increased from year to year until the end of the 15 th c century.

The practice of descriptive geometry was very advanced among oriental peoples and among the Egyptians from a very distant epoch. After the transfer of the Roman empire to Byzantium, t the mathematical sciences had powerful centres at Byzantium itself, Alexandria, later at Bagdad, and in the countries subject to the domination of the caliphs. The first crusaders found in Syria schools by which they benefited, and from the beginning of the 12 th century the art of projecting solids, of developing their surfaces was already practiued in the West. If the e elements of geometry seemed scarcely known to Carlovingian constructors, they were evidently familiar to the Cluniac architects, who erected the nave of Vezelay about 1100; and 30 years later in the construction of the porch of the same church, one perceives that these constructors have already an extensive knowledge of descriptive geometry, for all parts of that porch and notably the masonry are drawn with certainty and precision. Much more, in the drawings of that beautiful Cluniac school, o one sees originate a system, no longer empirical like that of the constructors preceding the middle ages, but based on a principle, that is excellent in our ~~eyes at least~~, because it is logical aud true. We shall explain that method in some words. Every structure is erected to fulfil a purpose, proposes an aim for itself; it seems then that this is the object that must impose the means; this means is or must be essentially subordinate to the object. For example, a hall has a void covered area as its object; this void space is the object and not the piers or walls; these are and must be only the means of obtaining the void. Assume that the hall is vaulted, the vault covers to the void space and is the essential part of the structure, because it is necessahy to maintain it in the air. it is then the vault, its form, extent and weight, that determine the arrangement, the form and strength of the points of support. By logical deduction, the area to be covered and the means of covering it (being a vault) being given , the vault must first be

sensible results. Only after the first crusades was perceived a notable development of these sciences in France. At the end of the 12 th century, the masters of works had resumed possession of geometry, and since that epoch their skill in that science increased from year to year until the end of the 15 th c century.

The practice of descriptive geometry was very advanced among oriental peoples and among the Egyptians from a very distant epoch. After the transfer of the Roman empire to Byzantium, t the mathematical sciences had powerful centres at Byzantium itself, Alexandria, later at Bagdad, and in the countries subject to the domination of the caliphs. The first crusaders found in Syria schools by which they benefited, and from the beginning of the 12 th century the art of projecting solids, of developing their surfaces was already practiued in the West. If the e elements of geometry seemed scarcely known to Carlovingian constructors, they were evidently familiar to the Cluniac architects, who erected the nave of Vezelay about 1100; and 30 years later in the construction of the porch of the same church, one perceives that these constructors have already an extensive knowledge of descriptive geometry, for all parts of that porch and notably the masonry are drawn with certainty and precision. Much more, in the drawings of that beautiful Cluniac school, o one sees originate a system, no longer empirical like that of the constructors preceding the middle ages, but based on a principle, that is excellent in our ~~eyes at least~~, because it is logical and true. We shall explain that method in some words. Every structure is erected to fulfil a purpose, proposes an aim for itself; it seems then that this is the object that must impose the means; this means is or must be essentially subordinate to the object. For example, a hall has a void covered area as its object; this void space is the object and not the piers or walls; these are and must be only the means of obtaining the void. Assume that the hall is vaulted, the vault covers th the void space and is the essential part of the structure, because it is necessary to maintain it in the air; it is then the vault, its form, extent and weight, that determine the arrangement, the form and strength of the points of support. By logical deduction, the area to be covered and the means of covering it (being a vault) being given , the vault must first be

drawn, and its drawing imposes that of the piers or walls. In all things, it is the conclusion one desires to reach, that is required by the conditions, and no one will commence a book or a discourse without previously knowing, what he desires to demonstrate.

A method so natural, simple and logical, then opened a new field to architecture, such as would again be opened today, if men would take the trouble to apply it with rigor and utilizing the elements at our command. We state that then in the 12 th c century, this method opened a new field to art, because from the decadence of the antique, art only lived on very confused and corrupt traditions, whose elements were forgotten or not understood, because men rarely gave themselves the trouble in architecture, no more than today, to make the premises accord with the conclusions, or the means with the purpose; they spoke for the sake of talking. In the midst of the confusion and ignorance of the practice of art, the introduction of a method satisfying the mind, easily applicable, which required at first only a knowledge of geometry of little extent, tha was further capable of infinite improvements, as the result has proved, and as one recognizes when he desires to apply it, must produce one of those sudden developments occasionally marked in the history of the art. That is what occurred. Happily for the time, the Cluniac monasteries were the most intelligent in the West, and were at the head of instruction in all the sciences, that could then give a new direction to arts and letters. If one e examines the monuments erected by those religious during the first half of the 12 th century, he ascertains to what degree they had been able to assimilate that architecture, whose elements they had acquired in Syria, and also how they had fertilized these elements by subjecting them to a geometrical method rigorously deduced from the purpose. Henceforth in drawing the structure, it was the object supported, its shape, weight and logical position, that would impose the members and forms of t the member that supported. Once again was then an advance, a new idea, for that idea had not been developed with that rigor, neither among the Greeks nor in Roman edifices. It would again be in our days one of the elements of progress in leaving this to the time, and in taking into account studies pursued in spite of academoc restrictions, because it is singularly suited for

using the new materials, that industry supplies to us.

It must be stated, that to apply rigorously the method of d drawing introduced by the masters after the middle of the 12 th century, it was necessary for themselves to be draftsmen, and that the architectural forms should be combined according to t the needs of the construction. It was essential for them to have constantly before their minds the practical means applicable, not only to the part, but to the entirety. They did not trust themselves to the operation of facing (derssing after erection), so convenient to conceal nemligence, forgotten things or errors; for each stone from the hands of the workman must take just the place intended for it, according to the necessary form drawn in advance, to never be retouched. The system of vaulting invented by those masters about 1150, and so rapidly attaining its logical development, a system whose elements were entirely new, derived from a special method of drawing, rigorous in its principle, but very extended in its applications. In studying the edifices erected in that old France from 1130 to 1160, one easily discovers schools that must have trained the constructors during that period, the difficulties that arose from a still imperfect application of the method to be followed, the improvements developed as those masters entered farther into the t true application of the system adopted. In fact thus is formed an art, and not by vague attempts, products of what is believed to be a spontaneous inspiration, or of a cloudy eclecticism, attached to no fixed principle. In architecture, everything is a problem to be solved; established traditions may be followed, and long furnish a career to the artist, but if those traditions fail, or be recognized as insufficient, for art not to fall into the last degree of weakness, it needs to resort to absolute principles, and must adopt a logical method in its course, close in its application. The masters of the 12 th century so understood their part, and if they have left us writings to tell us, they have erected sufficient monuments still active, to prove it to us. Then the developments of religious and military architecture chiefly occupied these masters, and yet the principles that they adopted extend to all other branches of art. Once in the path logically traced, they did not leave it, for it led t them as well to the construction of ~~the church~~ in novel forms, as to that of the fortress, the palace and the house.

We have been so strongly unaccustomed to reason, when this c concerns architecture: the academoc formulas are so hostile to examination, and just appreciation of the purpose, the need and the practical means, that in our days necessity being the law and being superior to the prejudices of the schools, the architects have seen arise beside them a powerful body probably destined to absorb them. Tose that we term engineers on the whole do nothing else, than the lay masters did about the middle of the 12 th century. They take as the law, the need exactly fulfilled by the truest and simplest means. If their method has not yet been able to develop new art forms, this must be due t to the influences of schools, from which they have not yet dared to withdraw themselves entirely. They succeeded in freeing themselves , as one cannot doubt, for again necessity compelled them to this; the example that we present here will sooner or later end by convincing them, that those are degenerate traditions with which they must break; that such an art as architecture is not renewed by assimilating earlier forms without passing them through a careful examination, but much rather by starting from a principle established on reasoning and on logic.

Perhaps the monks of the 12 th century expressed theih regrets at seeing abandoned the traditions of Romanesque art and the remains of the antique arts, at the sight of the new school of lay masters, who sought to establish their system on examination, geometrical frocedures and the strict observation of the requirement; their complaints have not come to us, and besides if those occurred, the social movement that claimed to remove covilization from their exclusive influence was strongest. The schools of the monasteries themselves, although powerful, were carried along after the 12 th century, so far is the monastic establishmentr had retained the schools of masters of works. Yet it is necessany to render to these establishments the justice due them, they had commenced (the Cluniacs among all) the learned revolution, that was to renew the art of architecture. In their schools, as we have just stated, the study of g geometry was evidently in honor from the first half of the 12 th century. They commenced the ruin of Romanesque art, perhaps unconsciously, or at least they did not pretend to establish hieratism. Assuming that they may have recognized the danger t that menaced Romanesque traditions, they did not have to combat

this, irrational eclecticism of our academies of modern art, since they scarcely knew more than one architectural form, that which they had practised. A mark of genius seems to have caused this revolution in the art of building. Suger caused the church of S. Denis to be rebuilt in 1137. It was completed or nearly so in 1141. Then one already sees appear the system of construction termed Gothic in what remains to us of that monument.

The vaults contribute the most important part of this system, and are conceived outside of Romanesque principles. Fig. 1 explains the tracing of the part remaining around the choir erected by Suger. The round arch has completely disappeared; all the arches are pointed, and their horizontal projections imperatively require the place and form of the piers. In other terms, the architect must have first traced the vaults on his plan before deciding the arrangement of the piers. His intention evidently was to seek half arches of equal span as much as possible, since in all the part occupied by the c apels and the double s side aisles, it was necessary for the crowns of the vaults to be on a level or nearly so.

The piers A, B, C, D, B, and the archivolts A B, B C, C D, were rebuilt under S. Louis, but the plinths of the piers A, B, C, date from the epoch of Suger. As for the high vaults of the sanctuary, they were likewise rebuilt in the 13 th century. Thus we occupy ourselves only with the part comprising the chapels of the double side aisle belonging to the construction of 1137.

One will note tha the half diagonal arches a b, c d, d e, df, etc, are sensibly equal. From the moment that the pointed arch is adopted, small differences in span of these half arches do not prevent their crowns from attaining the same level. The c crowns of the transverse arches F G, H I (pointed arches), are at a level lower than the crowns b and d; this must be, since the spans F g, g G, etc., of these arches are less than those of the half diagonal arches. As for the transverse arches K l drawn on a circular horizontal plan, their crowns are at a level intermediate between that of the crowns b d and that of the crowns g h. The crowns m of the side arches neither reach the level of the crowns d. It results from this, that the vaults L K l f e, L K F O, are sensibly swelled upward.[1] These arches of the vault and their revolutions being drawn, the master of

works has projected their imposts on the points on which they must rest, as we have indicated at P for the column p, the profile of the transverse arch being n and that of the diagonal arches S; -- these imposts have imposed the form and dimensions of the abacuses, and consequently those of the capital of the column; so that (see the detail R of a chapel) these columns take a diameter according to the strength or number of arches that they support, which is perfectly reasonable and logical.

There exists a notable irregularity in the general drawing of these chapels and side aisles of the choir of the church S. Denis. The projections of the transverse arches normal to the circular arc A B C do not tend to the centre O of this circle. The centre of the second arc E K is at T on the main axis beyond the centre O, while the centre of the third arc d d′, on which are placed the centres of the semicircular chapels is at Q, and that of the head e I of the chapels is at V. Thus the transverse arch H T, more again than x i, also more than p r. On the contrary, the transverse arch O a has less span than F G, etc. If we prolong to the main axis the horizontal projections of t the transverse arches A e, B T, C i, D p, we see that only the line A e falls on the centre T, and that the others strike the main axis beyond that point. The draftsman has balanced these lines as one balances the treads of a stairs in a winding portion, to avoid too great differences, that would be given by t the sectors at each of their extremities. In fact, if the master had drawn the rays tending to a centre, the arches at the entrances of the chapels would have had spans out of proportion to those of the archivolts A B of the sanctuary. The drawing of the arches of the vaults would have become more difficult, or rather the considerable variation in the lengths of the half arches would have been an embarrassment for the constructor, w without counting the bad effect produced in the eye.

There is also in these irregularities, appreciated only on a plan accurately laid out, an intended perspective effect. It must be recalled that the place Z in the sanctuary was occupied by a magnificent altar with the shrine of the martyrs, all restored with luxury by Suger, and that because of the deviation of the radii of the chapels, ceremonies performed before the altar of relics really occurred at the centre of these chapels. As for the greater opening of the transverse arches c e, relat-

relatively to those of the transverse arches of the front chapels, this was a means of giving more depth to the church on its main axis, and for opposing the effect of foreshortening of the apse produced by perspective.

These refinements seem strange to us today, and rather than seek their sense or verify the results, we prefer to place these defects in location to the account of the ignorance of those old artists, free to marvel tomorrow at the no less important irregularities found in the monuments of Greek antiquity; irregularities that result from a need of the eye, and from a very delicate appreciation of the perspective effects. Thus having two weights and two measures, disdaining here what we admire there, we do not take account elsewhere in our structures, of these consequences of the laws of perspective. It must be admitted, that if it was easy to modify the widths of the intercolumniations or the diameters of the columns in a Greek portico, since these researches do not modify the system of construction with lintels, it is much less so to apply these laws, imposed by a need of the eye, to vaulted edifices. It is necessary for the system of vaults adopted, to lend itself to these liberties; this is also what occurs when one abandons the Roman and the Romanesque vaults to introduce a new construction. Those masters of the 12 th century, so refined in their conceptions, largely profited by the facilities afforded by the new system of French vaults for obtaining grand effects by the aid of simple and practical means. Once the general plan was obtained, there was no embarrassment in turning an arch according to an angle more or less open. It sufficed to draw on the area the direction of that arch and its revolution. The template of t the voussoir placed perpendicularly to that direction gives t the springing of the arch. By collecting all those templates a at one point the impost is composed; next according to the forms of the voussoirs and the direction of the arches, the capital is traced that must support the impost. The capital being drawn, one has the column or pier. Thus it was by the general drawing of the vaults that the master commenced the graphical work of the plan. It is true that such a method required a very complete practice in geometry, not only on the part of the master, but also with the detailers, for it was necessary at each impost to take into account the penetration of the surfaces

that were grouped in clusters; but men will probably not claim, that this knowledge carried very far by the master and easily understood by the assistants, was ever a mark of ignorance and barbarism. Having laid before the eyes of our readers one of those general drawings, it is necessary to penetrate farther into the methods of detail. Let us take one of the simplest. Let (Fig. 2) be the jamb of a doorway with external recessions. This splay must necessarily be covered by arches. For making t these arches we shall take stones of dimensions proportioned to their spans. Let A B be a scale to one toise (6.5 ft.) Dimensions of 1.1 ft. will be given to the voussoirs; the splay having a depth of 4.4 ft., four superposed rows of voussoirs will cover it. On the tympanum T as a centering, we shall draw the first row B of voussoirs; on this first row the second C, and thus for the two others, D and E. An archivolt band F will enclose the four rows. The horizontal projection B C D E of the imposts of these voussoirs will give the dimensions of the capitals, whose upper squares G will then have 1.1 ft. on each of the two visible sides. According to the projection that we wish to give these capitals from the shafts of the columns, we draw the latter. If they must be engaged, these shafts are drawn t tangent to the sides a, b (see detail H); then the capitals themselves will be engaged, and their centres will be at d. If we prefer these capitals to be entire, we draw the shaft of t the column with its centre at the middle i of the square. The two methods were adopted in the 12 th century, but the second is rarer in the French provinces than the first. The projection of the abacus will be free and will be regularly profiled around the top of the capital. This projection will stop the band F of the archivolt. Further, the horizontal projection of the capitals and their abacuses will give those of the bases and their plinths, as proved by the vertical projection L. This v very simple detail, since it is only necessary to draw a series of concentric archivolts, emphasizes the dominant principle. These are the arches and their horizontal projection, which determine the form of the capitals, shafts and bases of the columns. The master must draw these rows of arches before drawing the ground plan.[1]

Note 1.p.208. Art. Porte, Figs. 58, 59, 60, 62, 63, 64.

It if be necessary to draw the arches of a nave and their sup-

supports, the operation is (necessarily) more complicated. In architecture as in everything, when a new principle is adopted, the first applications made of it are not the simplest. Our s steam engines are less complicated than were those of the beginning of the (19 th) century; it is only by study that man comes to simplify what his genius first made him invent.

Let us place in parallel two systems of piers of naves supporting cross vaults (Fig. 3). That at A belongs to the cathedral of Paris; the other is from the cathedral church of Rheims. The first dates from 1195, the second from about 1220. Let us glance at the section of the nave of the church of Notre Dame of Paris. (Art. Cathedrale, Fig. 2). We shall see that the cylindrical piers support in the ground story two archivolts, a transverse arch, two diagonal arches, and a group of three little columns destined to support the arches of the high vaults; in the second story, a vaulted gallery, i.e., a transverse arch and two diagonal arches; at the height of the windows, a buttress, the wall pierced by openings, two little columns for the side arches, the transverse arch and the two diagonal arches of the high vaults. In retaining the system of cylindrical piers, the master of works certainly believed that he started f from a simple principle, and yet this first point must cause him embarrassment and require complications in the drawings.

On our Fig. 3 at A is seen the horizontal projection of all those members superposed on the half circumference of the cylindrical pier. On that perimeter the draftsman starts the transverse arch a and the diagonal arch b of the side aisle, the archivolt c c d with two rows of voussoirs supporting the longitudinal structure, the little column e and that at f destined to carry the transverse arch anf the diagonal arches of the h high vaults. To receive these members, he traced the abacus of the capital square with angles cut off, which does not prevent the horizontal surfaces v supporting nothing. This first drawing receives the plan of the piers at the level of the gallery, the plan found in g h i j k. Against the inner side of this pier were drawn the little columns l of the transverse arches and m of the diagonal arches of that gallery. The horizontal projections of the arches of these vaults are the same as those of the arches a b of the vaults of the side aisles. The opening of the gallery being enclosed by an archivolt, the horizontal projection

of that archivolt was drawn at n and s, projecting toward the nave to n′, the face of the tympanum of the lower archivolt to form a projection over the capital of the angle pilaster (Art. Cathedrale, Fig. 4). As for the internal archivolt s, it serves as a side arch for the vault of the gallery. To open the arch better, the little archivolts forming the arch (Art. Cathedrale, Fig. 4), start at t on the pilaster i, and not on the little column. The external face of the wall over the gallery being at u, borne on the side arch s, the external buttress is at X X′r. (Art. Cathedrale, Fig. 2).

The little columns e and f continue to rise and receive the transverse arch e′ and the diagonal arch f, whose impost is projected on our Fig. These springings give the form of the capitals and abacuses traced at y. On the projection Z of this abacus remaining square rests the base of the little column W, that bears the side arch of the high vault. It should not be forgotten that these high vaults are hexapartite, that the diagonal arches occupy two bays, and consequently give a horizontal projection of near 45°. The difficulties in drawing would have been increased, if these diagonal arches had been the diagonals of a single bay.

By this example one sees what complications and what experiments would result from the incomplete use of a method, the p principle being once adopted. The arrangement really commences only above the abacus of the great capital, and this arrangement is restricted by this need of a square abacus set parallel to the main axis of the nave. The architect has proceeded logically for the upper part; he has first traced his arches of the vaults, and that has given him the form, the place and the dimensions of the supports; but this squar surface in which it is necessary to remain, and which was given to him by the lower cylinder, obliged him to combine the members, to confuse them with each other to find their places. Yet in spite of efforts, he has left unoccupied surfaces on these abacuses, too limited in two directions. Desiring to have cylindrical piers in the ground story, and adopting the arrangement of the new construction, it would have been more logical and simpler to place the abacuses diagonally, since it was parallel and perpendicular to the main axis of the nave, that he must develop the members of the construction. In fact, if the abacuses had been drawn

as we have indicated at G, the draftsman placing the diagonals in the direction of the development of the supporting members; he would have been less restricted and would have left no surfaces unoccupied. As one indeed thinks, this reasoning was soon followed by the masters after the beginning of the 13 th century. The cathedral of Rheims was founded in 1212; the part of t the nave adjoining the transepts was erected about 1220, 25 y years after the construction of the piers of the nave of Notre Dame of Paris. The plan B (Fig. 3) gives half the horizontal projection of one of the piers of Notre Dame of Rheims (old part), with the members supported by these piers. The architect returns to the cylindrical pier, but he diminishes its relative diameter, and he attaches to it four engaged columns. [1] On that pier (Art. Cathedrale, Fig. 14), he places a capital, or rather a group of capitals (Art. Chapiteau, Fig. 33), whose combined abacuses adopt the general form indicated in G. But by these columns engaged to the cylinder and the frank form of the abacuses, the arrangement commencing above this pier is connected to the lower part. In fact, the engaged column C (next the nave) supports another column with a diameter slightly less than that of the two little columns D, which extend to the high vaults to receive the transverse arch F and the two diagonal arches H. T The engaged column K supports the longitudinal archivolt whose width is K′K″, and above appears the pier L V N of the triforium with its little column O, then the jamb of the upper window U U′U″ enclosed by the side arch of the high vault, whose little column is at I. The engaged column P bears the transverse a arch Q; above the rear wall of the triforium R is joined to the closing wall of the internal passage S S′. On the pier is detached the column T″ against the buttress with external passage. The diagonal arches of the vaults of the side aisles are at V, their trace on the abacus being V′. [1] The advance from the preceding example is very evident. All the members have their places, no longer interfering with each other; thus at Notre Dame of Rheims the stability is perfect, the effect clear and the appearance is reassuring. The logical consequences of the principle however must be pushed yet farther.

Note 1.p.208. An attempt of this kind had been made already in the part of the nave of Notre Dame of Paris next the towers, whose construction dates from about 1215.

Note 1.p.209. To properly know the place and function of all these members, it is necessary to have recourse of Fig. 14 and Art. cathedrale.

In 1231 was commenced the work of reconstruction of the nave of the abbey church of S. Denis. The architect charged with t that rebuilding remains unknown, like most masters of works of that epoch. But the edifice that he has left to us indicates in all its parts a certainty and perfection rare in the art of drawing.

As we have just done for the cathedrals of Paris and of Rheims, let us take one of the piers of the nave, and see how different stories of the structure rest on this pier. The last t traces of the cylindrical column, that accords so little with the different members of the vaults, are effaced; the arches of those vaults absolutely determine the form of the pier. The longitudinal archivolts consist of two rows of voussoirs, according to custom; [2] the transverse arches of the vaults of the side aisle, that receive the stone floors of the terraces, are composed of the same number of voussoirs; then are necessary the places of the diagonal arches. The high vaults consist of a transverse arch only supporting the fillings and having a s single row of voussoirs 13 ins. wide, two diagonal and two side arches, that enclose the tracery of the windows. The necessary positions of these members of the vaults rigorously determine the form and number of the members of the pier. In fact (Fig. 4), the transverse arch of the vaults of the side aisle comprises the two members a′ and b′; the diagonal arch has the member c. The transverse arch of the high vaults consists of the member d, a diagonal arch of the same vaults, and of the member e. The horizontal projection of the imposts of those arches is traced on our Fig. with their profiles. The diagonal arch c of the side aisle can start and take its curvature before the half b of the transverse arch, so that this diagonal arch rests on the bearing that serves as support for that half b; thus the two projections are seen to intersect on c. The pier consists of a single engaged column for these two combined members. The projections of these arches are further exactly comprised within the lines f g h i j k l m n o p intersecting at right angles and forming the block of the pier. The engaged columns are traced within these lines, their centres being on the diagonals,

so as to give the projection of the capitals, whose tops under the projecting abacuses is this projection f g h i k, etc. For the arches of the great vaults is traced a special cluster of engaged columns q r; the abacuses of the capitals of these arches are drawn in s t u v; the projections of the abacuses of the other capitals in f′h′k′, etc. At the side A of our Fig. is drawn the pier with its bases. Above the longitudinal archivolts at the height of the triforium is separated the little engaged column B, which supports the side arch of the interior. At D E F G H is drawn the pier at the level of the triforium. The passage is at P, the perforated wall of this triforium is at I, and the external buttress at K L. Above the triforium is drawn the window with its little column M, that bears externally the enclosing arch, that is only the side arch itself; thus the centre of this little column M is on the same line as that of the little column B. At the level of the windows is placed on the buttress K L the isolated column N, which receives the head of the flying buttress, and which leaves a passage above the triforium between it and the pier O G.

Note 2.p.209. Art. Architecture religieuse, Fig. 36. This engraving gives in perspective the section of the nave of the abbey church of S. Denis.

It is easy to recognize that this last drawing is preferable to the two former. This is more clear and logical. The arches of the vaults each have their support; the capitals of these supports are clearly accented by the blocks of these arches o oomerined within the rectangular parts. The projections of the bases of those of the capitals are the same, except for the b bases that the angles judiciously cut off at V, so as not to restrict passage.

In this path, the masters of the middle ages could stop only at the final limit. Men in our country do not submit to logic with impunity. It pushes us onward, and carries us to the limits of the possible. Fifty years at most after the adoption of these principles of drawing, the architects arrived at giving to the piers exactly the same horizontal section as that of the arches; one can take this fact into account by examining Figs. 15, 16 and 17.of Art. Pilier. These methods led them to conceive a construction only by traces of horizontal projections s superposed, and naturally the plans of the upper parts (comple-

(completion of the work), that determined the horizontal sections of the lower parts. From the time of Villard of Honnecourt, men still adhered to drawings conceived in the spirit of those that we have just presented. One finds among the sketches of t that architect indications, that agree accurately with the methods suggested by the study of the monuments of that epoch. [1]

Note 1.p.211. See Album de Villard de Honnecourt. From the original manuscript, published by J. B. Lassus and A Duval.1858.

Villard of Honnecourt gives some plans of vaulted edifices, and one can verify that the drawing of those plans is essentially derived from the necessities of the construction of the vaults. This fact is evident to whoever will glance at the plans of the cathedrals of Cambrai and of Meaux, [1] at the plan conceived and discussed between Villard and Pierre of Corbie, [2] on that of the choir of Notre Dame of Vaucélles, of the order of Citeaux. [3] This last plan, whose principle we give (Fig. 5), is one of the most beautiful conceptions of the beginning of the 13 th century. [4] The method of drawing the apse is simple. The quadrant A B was divided into 7 parts. Each of these radii gives either the position of the piers a b, c d, or the centres of the vaults e f g h, etc. The circular chapels are adroitly connected to the side aisle, while leaving easy passage. The arches of the vaults are combined in a way to give half arches of nearly equal development. A general plan being thus traced, the architect had the direction of each arch. He decided on th their sections, then placing these sections on the imposts according to the direction indicated, he derived from this the drawing of the pier.

Note 1.p.212. Plates 28 and 28.

Note 2.p.212. Plate 28.

Note 3.p.212. Plate 32.

Note 4.p.212. The Cistersian church of Vaucelles was erected at some miles from Cambrai; it was dedicated in 1235 by Henri de Dreux, archbishop of Rheims. It was still standing in 1713, and was only destroyed at the end of the last (18 th) century.

We have frequentyl had occasion in the course of this Dictionnaire to give meneral and detail drawings of edifices, but it does not seem useful to insist here on the geometrical procedures of those drawings. What is important is to emphasize is, that the systematic side of those procedures, either as con-

concerning the composition or as concerning the construction and the value or form to be given to the various members.

Those who deny the utility that can be derived from the study of our architecture of the middle ages, because most frequently they have not taken the trouble to know its spirit and elements, or pretend to regard our researches as a tendency to a purely material revival of the forms adopted by the artists of those distant epochs (although we have always said and written that these studies should only be regarded as a means, and not as the type of an unchangeable art), sometimes disdaining this architecture because they believe it to be only construction and not art; sometimes accusing it of alowing itself to be led into the strangest caprices, or even to be subtle and bold beyond measure; to be the result of ignorance suddenly aroused, or of science without choice of form; to be poor in invention, or rich to excess in details, hieratic or capricious; so that if by chance had to combine those appreciations, the difficulty would be to harmonize them before opposing the excess and error in them. Yet if one examines with care the methods employed by these masters of the middle ages, he recognizes at once that they are derived from definite and clear principles, established on profound and judicious observation of the conditions imposed on the architecture in general, whatever the surroundings or the time; that its methods are developed according to a logical procedure in its course, faithfully applied in practice.

No architecture can bear better than ours during the best period of the middle ages, this superposition of the plans of a structure, a superposition which shows that no member is superfluous, that all have their places marked from the basis. Let one try to make proof of this; and with the smallest portion of good faith (yet some is necessary), he will very quickly recognize, that neither Greek nor even Roman architecture, so frequently rational, possesses to the same degree these logical qu qualities of construction.

"The system of drawing of our architecture of the middle ages, from the 12 th to the end of the 15 th centuries, can be summarized in these few words:-" the object supported determines t the form of the support; " and that witnout being able to find a single exception to this so simple and natural law. It is far

from this system to the absence of all system, which causes us, among other examples, to erect columns along a wall to support nothing at all, and to occupy the eyes of idlers, we frankly admit; but to regard as progress that forgetting the most natural laws of architecture, and to assume scornful airs before the works of artists, who have applied rigorous reasoning to what they were doing, when men have lost the habit of reasoning, would cause a smile, were it not so costly.

TRANSEPT. Transverse Aisle. Transepts and Crossing.

A word derived from Latin and that several write transcept. We prefer to adopt the orthography transept, from trans and sepire, to enclose beyond. In fact, in the primitive basilicas and in the old monastic churches, the enclosure of the choir is placed in the transverse aisle, the apse being reservedfor the sanctuary.

The Roman basilica sometimes possessed a transverse aisle, i.e., a transverse space between the tribunal and the aisles. In the basilica of the forum of Trajan (basilica Emilia), the tribunal occupied the width of the five aisles; the side aisles returned before the semicircle; [1] then where these side aisles formed a sort of transverse aisle, where between them and the tribunal remained an interval required for the construction of the roof. Several Christian basilicas of the first centuries possessed a transverse aisle. On that principle is constructed the basilica of the Nativity at Bethlehem, which dates from t the 6 th century. Th basilica of S. Paul-without-the-walls (Rome) was commenced in 386 and entirely completed under the reign of Honorius, was restored several times, and notably in the 13 th century possessed a vast transverse aisle, belonging to the Theodosian arrangement. This primitive transverse aisle formed a sort of separate work, and studied with the texts relating to the first Christian liturgy, it presents an arrangement of great interest, that one finds again in the basilicas of S. Peter of Rome, S. John Lateran, S. Maria Maggiore, and S. Peter in Bonds. (Rome). [2]

Note 1.p.214. See the fragments of the plan of the Capitol.

Note 2.p.214. We advise our readers to consult on this subject the excellent work of M. Henry Hubsch; Monuments de l'architecture chretienne, translated by Abbe Guerber (1866. Morel edition).

This collection of churches of the first centuries was made with rare care, and shows how scrupulously our neighbors beyond the Rhine examine the field of archaeological studies

The plan of the basilica of S. Paul-without-the-Walls gives us this transverse aisle of the well marked primitive church. The principal nave andthe four side aisles (Fig. 1) are separated from the transverse aisle by a wall pierced by a triumphal arch and four secondary arches. The main altar is placed at A, and with its enclosure over the crypt (confessio) separates t the choir B, occupied by the chiefs among the clergy, from the believers placed in the nave.

The transepts were filled by clerics and persons clothed with a religious character. It should not be forgotten that in the first centuries of Christianity, the altar was surrounded by veils, that were opened only at certain moments in the offices; thus the transverse aisle was the sacred place, the cell into which the laity did not enter. A last tradition of pagan worship, and also a custom of the Jews, that we find retained in the liturgy of the Greeks.

The transverse aisle was of small extent in the Roman basilica, when it exists, but assumes considerable relative importance in the great primitive Christian basilicas; the transverse aisle gives the Christian edifice its religious character, for the aisles are only a place of assembly. Thus it did not cease to be employed in monastic churches. The plan of the church of the abbey of S. Gall (Switzerland) indicates a transverse aisle in front of the main altar, a transverse aisle that contains the choir of the religious and the ambos. The remains of the a abbey church of S. Denis built by Dagobert, and found again by us beneath the pavement of the church of Suger, showed the transverse aisle before the semicircular apse. We see a sort of transverse aisle emphasized before the sanctuary of the little church of Vignory, whose construction dates in the 10 th century.[1] In the abbey church of S. Savin near Poitiers, which dates from the 11 th century, a very prominent transverse aisle separates the nave from the sanctuary.[2]

Note 1.p.216. Art. Architecture religieuse, Fig. 2.

Note 2.p.216. The same, Fig. 11.

Yet the transverse aisle did not appear in the same manner and at the same time in the different schools of religious ar-

architecture of ancient Gaul. If it seems inherent in the plan of the churches of the southern provinces, it only appears l later and in a manner less frank in the provinces of the North. As for the abbey churches, the oldest, they are always provided with extended transverse aisles. This arrangement was imperatively demanded by the religious service of the Benedictine monks, and it was followed by the Cistersians in the structures that they erected in the 12 th century. The abbey of Cluny even possessed two vast transverse aisles only separated by two bays of the nave.[3]

Note 3.p.216. Art. Architecture monastique, Fig. 2.

Before the absolute adoption of vaults in the construction of churches, the arrangement of the transverse aisle already presented to architects serious difficulties; for if it be easy to place roof trusses on the parallel walls of the nave, it is le less easy to cover by carpentry a square area when having only the corners as points of support. Thus in the oldest basilicas with transverse aisles, where the walls of these transverse aisles rise above those of the high nave, and the carpentry then rests on transverse arches spanning the width of the nave; or on the contrary the walls of the transverse aisle are lower t than those of the nave, and its carpentry rests on arches spanning the width of the transverse aisle. Also sometimes four transverse arches are turned at the intersection of the nave with the transverse aisle; on those arches rises a sort of square tower, that has its separate carpentry with two gables. For example, this arrangement is adopted in the monastic church of Montreal near Palermo, [4] and in the cathedral of Cefalu (Sicily), both built under the Norman domination in the 12 th century. There is every reason to believe that the church erected in France and particularly in Normandy, in the 11 th century, presents this arrangement. Vaults having replaced all visible carpentryin those edifices during the 12 th and 13 th centuries, one can only furnish presumptions in that respect; but the central vault of the Norman transverse aisle forms a lantern and seems to be a tradition of elevated carpentry, that we still find at Cefalu and at Montreale near Palermo.

Note 4.p.216. See the work of the duke de Serrilifalco; Del duomo di Montreale. Palermo. 1838.

But(as we have already stated), in the monastic churches in

Gaul we see the transverse aisle frankly emphasized from the olde epoch. The plan of the primitive church of S. Remi at Rheims is still visible in spite of the modifications that it has suffered, possesses a very extended transverse aisle, on w which open five eastern chapels, besides the sanctuary. This t transept and the nave were originally covered by carpentry with four transverse arches at the intersections of the walls. We give its plan (Fig. 2), [1] that only differs from that of the great basilica of S. Paul-without-the- Walls of Rome only by the side aisle of the choir and the addition of chapels. Here again the religious occupy this vast transverse structure, and the nave was reserved for believers.

Note 1.p.217. In this plan all black parts still exist; those hatched were replaced by constructions dating from the end of the 13 th century, and are only visible in the foundations. The old parts date from the 10 th century.

At S. Remi, the choir of the religious was then at A and the altar at B; the shrine of S. Remi was at C. The side aisles of the church of the 10 th century were vaulted by means of tunnel vaults resting on transverse arches perpendicular to the axes of the nave and transverse aisle. A triforium or gallery covered by carpentry placed on arches rose above ~~the side aisles~~ and under the high windows of the nave. (Art. Travee, Fig. 1).

Later the principle of the primitive arrangement of the transverse aisle was lost, and the believers invaded the aisles; a side aisle extends around the sanctuary, except in the least i important churches; it is furnished with numerous chapels; during the offices the religious further occupied only the crossing and the last bays of the centre aisle. Then the middle of the apse became a sacred place, reserved for the deposit of relics and treasures, to which believers were not admitted. T That apse gains in depth; the altar of the religious remains b beneath its transverse arch at the entrance or advances to the middle of the crossing. This transformation occurred in the ab abbey church of S. Remi itself at the end of the 12 th century. The choir of the religious was placed at D; the semicircle behind the altar was much deeper, and still contained the shrine of the S. bishop, but the faithful turned around this sanctuary closed by an enclosure and had access to the radiating chapels built on a very great scale.

About the end of the 11 th century, when it was decided to r replace by vaults the carpentry of the high naves, men commenced by establishing tunnel vaults; they did not dare to undertake to construct cross vaults of great span; [1] but at the centre of the crossing were compelled either to make a cross vault at th the intersection of the tunnel vaults, or a dome. They decided for the latter, they distrusted so much the stability of great cross vaults in the Roman style.

Note 1.p.218. The nave of the abbey church of Vezelay was b built about 1100 and forms an exception. There they attempted to build cloister vaults, (Arts. Architecture religieuse, Fig. 21; Travee, Fig. 4), which are rather domes with folds at the imposts.

The pretty churches of Auvergne, all built on nearly the same pattern about 1100, [1] furnish us with several examples of plans with transverse aisle and very judiciously conceived. The plan (Fig. 3) of the church of Issoire leaves the primitive form in the arrangement of the transverse aisle. On the four piers of the crossing are turned four transverse arches, that bear little pendentives in the corners forming an octagon; on this octagon rises a domical vault abutted laterally at a and b by half tunnel vaults; [2] over the dome rises a tower. The sanctuary A is raised several steps above the pavement of the transverse and the circular side aisle. Two stairs descend into the crypt. Believers had access everywhere, except in the sanctuary, and in fact the two transepts c, d, are only appendages of the two eastern chapels e, f. This plan is so well conceived, that it must give in elevation a motive of great originality, and which abandons the principles adopted until then.

Note 1.p.219. Notre dame du Port, S. Nectaire, Issoire, Ebreuil; church S. Eternoe od Nevers must be placed among the religious monuments of this beautiful school of Auvergne.

Note 2.p.219. Art. Architecture religieuse, Fig. 10 bis.

Here (Fig. 4) is the perspective view of the apse of the church of Issoire with its transverse aisle. One sees that the t two ends of the arms of the cross near the eastern chapels do not rise above the nave and the apse; but the two parts a, b, of the plan, which receive the half tunnel vaults, designed to abut the dome, form a first tier with grand effect, that leads the eye to the second tier enclosing the dome and bearing the

central tower. Unfortunately those upper parts have been made heavier and disfigured at different epochs, but it is easy to recognize on the monument itself, and by the examination of t the constructions, the primitive arrangementsbeneath the excres- cences that take away a part of its grace. Materials of differ- ent colors in certain places form mosaics, that give refinement and elegance to this structure skilfully arranged in stories. The Auvergne plans form a school, and had their imitators in Nivernais at the North; even in Limousin and Languedoc at the South. However, in these last southern provinces, these imita- tions only seem to be applied to abbey churches.

The most important of all is certainly the celebrated church of S. Sernin (S. Saturnin) of Toulouse, whose choir and trans- verse aisle date from the beginning of the 12 th century.

Fig. 5 gives at A half the plan of its apse with the transv- erse aisle and a portion of the nave. Here the transverse aisle is no longer reserved for the religious, and they remain in the choir placed in C, while the altar was established at a on the crypt enclosing the tomb of S. Saturnin. At b was a rear altar, reserved for certain ceremonies. At the north and south ends of the transverse aisle are pierced wide doorways p, p, that we fully show at P; doors made for believers, or rather for pilg- rims that came in great numbers on certain days to the church of S. Sernin. The nave has double side aisles, and one of the two continues entirely along the transept and the sanctuary. A vaulted triforium surmounts these side aisles. This grand arrangement was followed about the same epoch at the constr- uction of the church of Conques. We give at B also half the plan of its apse and its transverse aisle. In the church of Conques, the religious occupied the same place as at S. Sernin. At Con- ques believers had no access to the church by the ends of the transepts but only by the side doors m. These plans sufficient- ly emphasize th importance assumed by the transverse aisle in monastic churches. Originally reserved for the religious or clerics, it was left to believers after the 12 th century; at this time it even occupies a greater surface, so as to allow the pilgrims, who attended in this abbey church, to be present in great numbers at the ceremonies of the worship, and to eas- ily see the sacred bodies taken from the crypt at certain seas- ons of the year, and exposed in the middle of the church.[1]

This programme, made for the construction of Benedictine and Cistersian churches about the beginning of the 12 th century, was rigorously followed during the following centuries. On the contrary, we see cathedrals rise in France on varied plans, a according to the provinces, and in those edifices the transverse aisle , so frankly and universally adopted for Benedictine and Cistersian churches, only appears here and there or at a relatively recent epoch. Certain churches of the South and of the Centre, like the cathedral of Angouleme, alone have the privilege of possessing accented transverse aisles; [2] but those monuments precede the movement in the North, that caused t the reconstruction of all episcopal churches. We have sufficiently explained elsewhere the nature and importance of this political movement, that it is unnecessary to return to that subject here. It will suffice for us to state this fact, that the greater part of the cathedrals commenced during the second half of the 12 th century in the royal domain, were originally erected without a transverse aisle. The cathedrals of Senlis and Meaux had no transepts; that of Paris was certainly projected without those appendages; [3] that of Bourges has none, and at Sens, it is easy to recognize how they were established long after the construction of the cathedral church.

Note 1.p.222. Art. Architecture monostique, on thot subject.

Note 2.p.222. Art. Cothedrole, Figs. 41, 43, 27, 28, 34.

Note 3.p.222. We obtoined the proof of this in the foundotions ond obove the voulte of the crossong. Very probobly it wos not decided ot Poris to give o tronsverse oisle to the cothedrol only ofter the completion of the choir, i.e., ofter the deoth of Mourice de Sully.

Excavations recently made in that edifice at our request by V. Lence, diocesan architect, measured and drawn with the greatest care by M. Lefort, inspector of works, have uncovered n no only the foundations, but the lower courses of the old piers in the axis of the present transverse aisle. Fig. 6 gives the plan of the later part of the cathedral of Sens. This plan was restored from the excavations, and only allows to be seen an embryo of a transverse aisle indicated by two chapels, C, C. [4] The nave and side aisles are divided in equal bays without interruption, and the spaces between the piers are likewise perfectly regular. Then (at the end of the 12 th century) the cath.

cathedral of Sens was connected with the plan, that seemed to be adopted for the episcopal churches of the royal domain, in general arrangement, although it retained points of relations to the monuments of Champagne, and notably with the cathedral of Langres. [1] The place of the archbishop was at A, and that of the main altar at B. At the end of the 13 th centsry, they began the construction of a transept gable wall b a. These works appear to have been long suspended, for only at the beginning of the 16 th century was that gable completed, and that at e f was erected at the North. [2] Then the bays g, h, of the old church were demolished, as well as the piers i, k, and they rebuilt the great vaults to cover these transepts found at the expense of the two old bays. It was probably at that epoch that the choir of the chapter was extended to the piers p, p; for when the transepts were scarcely marked by the two eastern chapels C, C, the clergy remained in the semicircle; the nave was left to the believers as far as the front of the altar.

Note 4.p.222. The portions of the plan modified during the 13 th, 14 th and 16 th centuries are hatched.

Note 1.p.224. Art. Cathedrale, Figs. 28, 30.

Note 2.p.224. Art. Cathedrale, Fig. 30.

Evidently, the programme of the monastic churches relating to the transverse aisle, varied according to the orders, the o provinces and the time; for in these monuments in France, we discover very different arrangements of transverse aisles, and especially in the provinces of the West the transverse aisles of abbey churches take an extraordinary relative development. In the abbey churches of S. Front of Periguеux (end of 10 th c century), the transverse aisle is equal in area to the nave a and choir, i.e., the plan presents a cross termed Greek. [1] The transverse aisle of the abbey church of S. Hilary of Poitiers, that dates from the 11 th century, was very large. A central nave and six side aisles abut against it. [2] the rare Benedictine churches rebuilt in the 13 th century still occupy developed transverse aisles, though the new preaching and mendicant orders erected churches without transverse aisles. [3]

Note 3.p.224. At Notre dame of Poitiers, the sanctuary was originally on a level with its side aisle.

Note 4.p.224. See monographie de la cathedrale de Noyon, by MM. Vitet & D. Ramee. Also Arts. Architecture religieuse, Figs.

30, 31; Cathedrale, Figs. 7, 10.

Note 1.p.225. Art. Architecture religieuse., Fig. 4.

Note 2.p.225. The abbey church of S. Hilaire of Poitiers was dedicated in 1049. See Notes of a tour in the West of France. (Parker. London. 1852.).

Note 3.p.225. Art. Architecture monastique.

It is settled that the transverse aisles were regarded by the old orders and the Cistersians as necessary for the service of worship. Churches preceding the mendicant orders, simplest in the composition of the plans, all possess comparativeln extended transverse aisles. We shall choose one more specimen among the last monuments erected with parsimony, the church of Obazine dependant on the abbey founded by S. Etienne of Obazine, a and rebuilt in the 12 th century; the more because the plan of this edifice presents an arrangement very rare in France. (Fig. 7). Besides the sanctuary, 6 eastern chapels open into the transepts and that project much beyond the nave. The stairs a communicates with the second story of the cloister buildings. The tomb of S. Etienne is placed at b. It is evident that this transverse aisle was reserved for the religious, and that the enclosure was placed at c c. Fig. 8 gives the section on e f of this transverse aisle, crowned by a tower over the crossing. Thus from the back of the choir the religious could ring the bells; they officiated at the chapels without leaving their enclosure, and the nave was only the place for the assembly of the believers, entirely independent of the parts reserved for the worship. The Cistersian churches present analogous arrangements, allowing the faithful to be present at the ceremonies w without entering the enclosure.

It does not appear that in the 13 th century at least, the B Benedictines adhered to retaining these claustral customs.

The plan of the abbey church of S. Denis will supply us with the proof, that either the example of the bishops, who had devoted the entire area of the new cathedrals to the believers e ended in modifying the monastic rules, or that in presence of this liberal arrangement of the episcopate and perhaps also f from the multitudes , that the preaching monks attracted in their vast churches open to all without enclosures, the Benedictines may have felt the necessity for no longer separating themselves from the believers, accustomed to circulate freely

in the churches: the religious of S. Denis always seem to have sought (when their church was in great part rebuilt about the middle of the 13 th century) to attract a multitude op the public into their basilica by broad arrangements, very far removed from the claustral customs of the preceding centuries.

It was necessary to contend against the fashion, that led the people to those preaching monks, whose churches were only large lecture halls, and this certainly was not by maintaining those numerous obstacles, that in the Cluniac churhces themselves obstructed the view and circulation, that one could hope to draw the multitude to the relics, whose prestige diminished daily. Thus it was no longer at the back of crypts that the shrines were preserved; they are placed in the sanctuaries and surrounded by precious objects. They are exhibited the more, that the people gradually lose the veneration paid to them. The pomp of ceremonies, the facilities afforded to believers to be present, replaced with the Benedictines the severe discipline previously maintained in their churches; with a lack of faith that slumbers or vacillates, they at least awake entirely.

Now the successive plans of S. Denis, so to speak, cause us to touch that modification in the relative customs of the great abbeys. Thus they merit attentive study.

Here (Fig. 9) are those plans presented on each other, so that the excavations and the traces of structures still existing can make them recognized. We see at a the remains of the foundations of the apse and of the transverse aisle of Dagobert, built with the remains of Gallo-Roman monuments. [1] During the Carlovingian period, the church was greatly enlarged to b from the apse of Dagobert; [2] then were placed the structures of Suger, still visible above ground at c. Then the two descents to the older crypts were arranged at e; [4] the sanctuary developed widely above the cellars of the Carlovingian church, and one must ascend to it by stairs placed at g on both sides of the altar and at h.

Note 1.p.227. Hatchings from left to right indicate these remains.

Note 2.p.227. Wide hatchings from right to left indicate these structures still visible in the crypts.

Note 3.p.227. Close hatchings from right to left indicate these works.

Note A.p.227. These descents still exist.

The nave of the church of Suger was narrower than that of the existing church, as it is easy to recognizeat the western entrance and by the excavations made at l. Then the transverse aisle of the abbey church of the 12 th century, furnished with a side aisle next the sanctuary, compresed the space m n o p. Th This side aisle A A was otherwise necessary to receive the steps that ascended to the sanctuary and those descending to the crypts.

These structures, partly established on the very badly built remains of the church of Dagobert, or on insufficient foundations, as it is easy to recognize, probably threatened ruin about the middle of the 13 th century. Either this reason may have determined, or that the edifice did not more perfectly respond to the needs of the time, and they resolved to rebuild almost entirely, and notably all parts of the transverse aisle, under the reign of S. Louis (1230 to 1240).

A vaulted cellar tha entirely exists at f clearly shows that the wall i was external, since it has a raised window; the walls j and the back of the side aisle of the transverse aisle yet exist, and one finds at K the foundations, which indicate that the structures of Suger did not extend beyond the present gable walls.

These structures, partly established on the very badly built remains of the church of Dagobert, or on insufficient foundations, as it is easy to recognize, probably threatened ruin about the middle of the 13 th century. Either this reason may have determined, or that the edifice did not more perfectly r respond to the needs of the time, and they resolved to rebuild almost entirely, and notably all parts of the transverse aisle, under the reign of S. Louis (1230 to 1240).

Our Fig. indicates in black all the structures rebuilt then. A glance at the plan causes to be understood the new importance given to the transverse aisle and the side aisles accompanying it. The nave was sensibly widened and harmonized with the sanctuary, whose spacings of piers were retained on the skew, which would appear very strange if one did not take into account the state of the earlier constructions, that it was claimed to preserve next the apse.

The piers F of the sanctuary were rebuilt anew, those at T

of the semicircle being on the bases of the 12 th century. Those at B were founded anew in the crypt, passing through the Carlovingian vaults. Men were contented to rebuild on the old foundations the piers that rest on the angle of the Merovingian apse; but instead of the three bays D, only two were made, and the steps ascending to the sanctuary were transferred to E. Chapels were established at F at the level of the floor of the sanctuary. One of the doors of the old transverse aisle of Suger was placed at G.[1] S. Louis desired to rebuild anew the to tombs of his predecessors. These tombs were placed at H, i.e., on the places that they had occupied in the preceding church. That of Dagobert rose at L, very probably on the spot where tradition had placed his interment.[2] Then the choir of the religious extended in the nave from the transverse aisle to the point M, and the public could circulate in the side aisles and cross the arms of the cross. Chapels were dedicated at N and P. Much later the last was occupied by the tomb of Francis I. In the 14 th century were erected other chapels along the north side aisle at K. The interments of the abbots filled the transept S.

Note 1.p.229. A similar operation was made at the cathedral of Paris, at those of Bourges and Chartres. The sculptures of the 12 th century were judged worthy of being preserved and w were replaced in the structures of the 13 th.

Note 2.p.229. In excavating the entire centre of the transverse aisle, we found beneath the floor of the church of Dagobert numerous Merovingian sarcophaguses. (Art. Tombeau, Fig. 1).

These superposed plans have this of interest, that they cause us to recognize the modifications made by time in the monastic customs of on of the most powerful abbeys of France. At first as in the primitive church, the very extensive transverse aisle, composed with the width of the nave, is made to contain and enclose the religious, who have no communication with the believers. Then under the Carlovingians, while maintaining the arrangement of the primitive transverse aisle, they added to it a deep sanctuary, that formed as it were a second church suited for the exhibition of relics. Under Suger, this chapel is enlarged, equipped with numerous chapels and the transverse aisle opens more on the nave. Finally in the 13 th century, the monastic enclosure in the church is no longer absolute; the choir

of the religious is entirely surrounded by believers, who have access everywhere as in the cathedrals, except in the sanctuary occupied by the relics, and in the choir surrounded by the stalls, closed to the nave by the rood loft and by low grilles next the two transepts. One will observe, that in this particularly venerated church, what is least modified is the transverse aisle; until the last works undertaken, it remains in t the same place. The altar also remains in the 13 th century at V, over the point consecrated by tradition. [1] This transverse aisle is placed in communication with the buildings of the abbey by a wide doorway. It likewise opens on the external side into the old cemetery called of the Valois. Ample steps allowed the believers to circulate in the side aisle of the sanctuary and to be present at the offices in the chapels.

Note 1.p.230. To take into account the old arrangement of the transverse aisle, which formed a part of the choir of the religious of S. Denis, see Art. Choeur, Fig. 2. Today the monuments are established in the transverse aisle according to the arrangement adopted under S. Louis.

But if the transverse aisle has retained its position and n nearly its primitive dimensions, it was no longer found in the 13 th century in the conditions in which it was found in the 6 th and even in the 12 th. The church developed around it for the benefit of the attendants.

Yet these transformations were manifested only in the churches of the great abbeys, the small religious establishments retaining nearly the old arrangements of the transverse aisle reserved to the monks. The church of S. Jean-aux-Bois near Compeigne is an example of one of those monastic structures erected in the 13 th century in small dimensions. Without side aisles, this church is composed of a wide nave and a sanctuary, separated by a transverse aisle with transepts each divided by a column on the extension of the lateral walls. [2] This pretty arrangement, so suitable for a small monastic church, is presented in a perspective view (Fig. 10). There is perceived in that Fig. the beam over the entrance to the sanctuary. [3] The stalls of the religious having their backs toward the transepts, and these behind the stalls leaving free spaces for guests or personages having access to the monastery. The nave was thus reserved for people from outside. They entered the transepts

only by little doors opening within the walls of the monastery.

Note 2.p.230. See the plans and elevations of this pretty edifice in the work of M. de Baudot; Églises de bourgs et villages. (Morel, editeur).

Note 3.p.230. Art. Trobes.

The parish churches suffer the influence of the neighboring abbeys or cathedrals. From a distant epoch most of them possessed transverse aisles, principally in the provinces of the North, Centre and East. In Poitou, Saintonge and Angumois, on th the contrary, it is not rare to find parish churches of the 12 th and 13 th centuries without transverse aisles. The crossings of these parish churches habitually surmounted by towers in t the provinces of Isle-de-France, Normandy, Burgundy and Auvergne. The transepts are either pierced by doors or closed, especially when they open into eastern chapels, so that persons entering or leaving cannot disturb the faithful. We have a beautiful example of these closed transepts of parish churches in the very remarkable church of Notre Dame of Dijon (Fig. 11). H Here the gallery of the triforium stops to leave space for the rose window, simply furnished with an iron framework.[1] The p passage beneath that rose window is supported by two small columns and three segmental arches.

Note 1.p.233. Art. Armoture, Figs. 6, 7.

Another lower passage is found between these columns and the windows of the ground story. The chapel of the transept opens opposite the side aisle of the nave, that does not extend around the sanctuary, so that each of these transepts leaves a fr free and quiet place for the believers present at the offices said in these chapels. There is indeed an arrangement suitable for a parish church of small extent. The horizontal plan perfectly explains the happy composition of the transverse aisle of the parish church of Notre Dame of Dijon.

But this plan is interesting to study from another point of view. When one desires to know an architecture, it does not s suffice to appreciate its style, to analyze its forms and practical means; it is necessary to discover the general principles, that have served to constitute it, to give it the homogeneity resulting from the use of a method. By pretending to study the architecture of the ancients independently of these primary l laws, men have fallen into the gravest errors, and anarchy has

taken possession of their minds, even by the extent of those s studies. It is true that we are sometimes told, that what we call anarchy or absence of method is nothing but an inspiration full of promise,.and that the art of the future will spring all armed some day, from the chaos of styles and forms adopted without criticism or examination. According to our feeling, this hope is only an illusion; for the works of the mind attain a d development, only when based in a principal having all the rigor of a formula. When that basis is established, the artist g gives himself up to inspiration, "if he has received from heaven the secret influence." That is for the best; but it is best to rest on the solid earth, to be able to rise.

When it is necessary to intersect the naves of a basilica by this transverse aisle and to cover the whole by carpentry, or indeed when rows of piers are destined to bear the tunnel vaults, drawing the transverse aisle did not present serious difficulties; it was otherwise when the French system of architecture with cross vaults was definitely adopted at the beginning of t the 13 th century; these drawings then demanded particularl attention. It was necessary to think of the thrusts acting in all directions; to relieve those spaces that required points of support the more solid, as they were larger; to combine the ends of the side aisles in that great transverse nave so that their arrangement accorded with the transepts; to think of the returns of the upper galleries, of a lighting in relation to the extent of the transverse aisle; to proportion the dimensions of the choir to that of the transverse aisle; to decide either for eastern chapels next the transepts, or the continuance of the side aisle around the choir,* etc.

To fulfil such diverse conditions, when one has for all method only his own inspiration, or a vague memory of what has been done in that kind before us, and it is necessary to take up the pencil and compasses, we frankly admit that one scarcely knows where to commence, and that one can arrive at a result nearly satisfactory only after long experiments; also he does not have a very tranquil mind, and may fear that this inspiration behind which so many vague minds shelter themselves may have failed at some point.

Now if the take the plans of churches of that epoch, we recognize that the methods of drawing them generally adopted, and

not without reason, are followed with still more attention, w when it is necessary to lay out transverse aisles.

We shall choose as an example of a method of drawing the plan of the transept of Notre Dame of Dijon. (Fig. 12).

Let R be a scale of 6 toises (38.4 ft.). The entire portion of the church with the transept to the apse is comprised in an equilateral triangle, whose half is a b c. The sides of this e equilateral triangle are each 14 toises (89.5 ft.); then the half a b is 7 toises (45.8 ft.). According to the necessity imposed by the system of vaulted architecture, the tracing of the vaults determines the tracing of the piers. The thickness of the wall b' of the transept being fixed at 3.2 ft., the line a b after deducting this thickness was divided into 3 equal parts; the first division line giving the axis p of the piers of the nave; and the second the axis of the pier at the angle of the transept. The drawing of the piers was decided on as at A for the great piers, and at B for those of the nave. It is well understood (Art. Trait), that these drawings of piers result from the form and dimensions of the arches of the vaults, that are fixed by the spans of those arches. The pier being km known, one fourth being sketched at A, nothing more is necessary than to place the axial line of this pier on the axis p of the division, according to the case, as we shall see.

The thickness of the wall of the apse being fixed at 3.2 ft., they at first claimed to make the spans g h, h i, i j, j k, e equal for the side arches of the apsidal vaults. To do this, the half l j of the decagon was drawn so that the radii i'o may equal the half o p of the nave after deducting the thickness r s (see detail A), the little column r' being intended for the low arcade and for the side arch of the high vault. Then from j to k was laid off a distance equal to i j. This point k being known, the template of the pier A is presented, t the point k being the centre of the little column r', the axis s being always on the axis p. Thus one had the axis of the transverse arch q. On the base a b at its intersection with the axis p was presented the pattern of the pier A. It remained to determine the position of the axis t. Now the distance of that axis from the base a b equals the distance of that base from t the axis V from a transverse arch of a bay of the nave, a baw longer than its width by several inches; i.e. t u equals u V.

The rest of the layout naturally follows. The distance t a is less than t u, which was the result of that mode of drawing, and which also gives a better proportion, than if those distances had been equal, for then the choir would have seemed too deep for the transverse aisle.

Another monument of the same epoch (1230 to 1240) and of the same provenance presents a very remarkable arrangement of the transverse aisle, the church of Notre Dame of Semur. Behind S Semur the side aisle continuing around the choir, the architect has established chapels parallel to the straight portions of that side aisle, so as to leave (the nave being very narrow) the necessary space for the believers on feast days. [1] it is rare to find in our parish or collegiate churches of Isle-de-F France, Champagne, Picardy and Normandy, arrangements as broad and well adapted to the service. In the last provinces, the transverse aisles of the parish churches of the 12 th and the beginning of the 13 th centuries are of small extent, encumbered by thick piers compared to the voids, and only in 1250 these religious edifices of the second order assumed amplitude.

Note 1.p.238. Archives des monuments historiques. See the plans and sections of this edifice.

By compensation, the arrangements of the transverse aisles of our cathedrals of the North, that are provided witt them, l like Laon, Rheims, Amiens, Chartres, are drawn with a breadth and an underbtarding of the great public assemblages, that l leaves nothing to desire. (Art. Cathedrale, see the plans of those edifices). Abundantly lighted by the rose windows opened in the gable walls of the transepts and by opened galleries, giving entrance from the choir into the double side aisles, m most frequently pierced by doors on the public streets, these transverse aisles of our great cathedrals are the most beautiful arrangement ever adopted to gather at one point a great m multitude of people. Hence the 14 th and 15 th centuries made no change in these arrangements.

Double transverse aisles with double apses, one at the east and the other at the west, very frequently adopted by the Rhenish school during the Romanesque period and until the 12 th century, are found in France only in the provinces of the East. The cathedrals of Verdun and of Pesancon possessed double transverse aisles with towers in the reentrant angles of the apses,

these not being surrfounde by side aisles. (Art. Architecture religieuse, Fig. 39; also see plan of the abbey of S. Gall; Art. Architecture monastique, Fig. 1).

In France, many of our abbey churches of the North had towers erected over the transepts. This arrangement exists at Notre Dame of Rheims, Chartres, the abbey churches of S. Denis, Cluny, Vezelay, etc. Sometimes vast porches open on the ends of the transepts, but this system so frankly adopted at the cathedral of Chartres, is later by some years than the erection of the transept. After the disastrous wars against the Albigenses, mo most of the churches rebuilt in Languedoc were erected without transepts. Such is the cathedral of Alby. The churches of the new city of Carcassonne, those of Montpezat, Moissac, etc., consist only of a nave with chapels. Indeed the construction of a transverse aisle required considerable expense, and if men claimed to erect a church with weak resources, it was necessary to avoid appendages.

It is rare to find in churches later than 1250 new arrangements in the construction of transverse aisles. Yet one church in Champagne forms an exception, S. Urbain of Troyes. Its transverse aisle is very ingeniously conceived, and entirely satisfies the programme of the parish church.[1] Two porches at the end of each transept shelter double doorways, and in the interior the vaults of these transepts are drawn on a new principle.

Note 1.p.237. See the plan of this church in Art. Construction, fig. 102.

The internal view (Fig. 13) of one of these transepts explains the original arrangement of this transept. Divided by a p perforated tracery in the gable, by two windows opened over t the external porch and by two other windows in the lateral walls above the side aisle of the nave and the chapel and flanks the choir, each of those transepts is a veritable lantery in its upper part. The appearance of the transept of S. Urbain is impressive. The architect knew how to avoid the poverty of the i insides of the gable walls usually lighted by rose windows over solid walls only pierced by doors in the ground story. This system seems to us preferable to that adopted in some edifices, s such as the cathedrals of Metz and of Soissons,[2] the church of Moret, etc., and that consists in replacing the rose windows by vast glass windows opening beneath the side arches of the

gables and descending to the archivolts of the doorways,[2] or to regard the rose windows themselves with the open gallery supporting them, as actual windows comprising the entire width of t the transept. But it must be added that the church of S. Urbain of Troyes is a masterpiece, whether one considers the meneral conception or the harmony of the details.

Note 2.p.237. North transept.

Note 3.p.237. Art. Pignon.

Very rarely do the transverse aisles of the church of the middle ages possess galleries inside the gable walls of the transepts; and when they exist, as at the cathedral of Laon and in the church of Eu, for example, those works date from an epoch later than that of the primitive construction of the edifice.

One must also regard as an exception the porches of transepts surmounted by a tower. The south transept of the cathedral of Mans furnishes us with an example dating from the end of the 13 th century.

TRAVAISON. Wooden Entablature.

An old word cossesponding to what is now understood by entablature; but applied only to works in wood.

TRAVEE. Bay.

A word employed to designate any arrangement between the principal points of support or the chief parts of the structure; thus is said the bay of a floor to indicate the joists comprised between two girders. Bay of a bridge is the part of the wooden floor comprised between two lines of piers or between two piers. Bay of a hall or church is the arrangement comprised between two main piers or two transverse arches. Bay of a roof is the space between two carpentry trusses.

From the moment that the hall is divided by points of support spaced lengthwise to support a vault, trusses or girders, that hall is composed of as many bays as it contains divisions.

In the construction of the middle ages in France, the history of the bay is interesting, because it determines the successive attempts by which, from the Roman basilica covered by carpentry, men arrived at the nave covered by cross vaults.

No one is ignorant, that the Roman basilica was generally composed of a principal nave, whose walls rested on rows of col-

columns, flanked laterally by single or double side aisles. The side aisles were sometimes surmounted by galleries or tribunes, above which were opened windows that lighted the ceiled carpentry. This arrangement was followed in the construction of the first churches and great assembly halls erected in Gaul. Each intercolumniation of the basilica formed a bay.

The plan of the Roman basilica was followed in the North of Gaul until about the middle of the 11 th century; but already before that epoch, the mode of construction had suffered modifications because of frequent relations of the western peoples with the Orient. The most ancient monument of that time which we possess in considerable dimensions in southern France is certainly the nave of the abbey church of S. Remi of Rheims. It is still easy to recognize, that this nave was originally c covered by visible carpentry, while the side aisles, vaulted in the ground story, were surmounted by a gallery covered by carpentry with transverse arches. Fig. 1 gives one bay of the nave of the abbey church of S. Remi. [1] The great wall A rests on a row of piers composed of clustered columns in the ground story, over these being piers of rectangular section to the level of the gallery of the second story. Columns with arches divide the openings on that gallery. Above the roofs of the side aisles open two rows of windows B and C. The vaults of t the side aisles in the great story consist of transverse arches D and F supporting tunnel vaults perpendicular to the nave and concentric with the archivolts E. The little piers G form a second narrow side aisle, for the purpose of diminishing the thrust that a single transverse arch would exert on the enclosing wall H. In the second story the transverse arch I bears o only a wooden floor, and could not exert on the wall H a thrust, that this wall reinforced by cylindrical buttresses cannot resist. The great wall A found itself shored by those tunnel vaults of the ground story and by the transverse arches of the gallery. It was only decorated by paintings, according to the custom of the time. [1]

Note 1.p.239. See a part of the plan of this nave in Art. Tr Transept, Fig. 2.

Note 1.p.241. In the 12 th century, vaults having been constructed over that nave, resting on little columns attached to t the piers with much skill, Flying buttresses must abut them. T

The tunnel vaults of the side aisles were destroyed as well as the little pillars G, and cross vaults replaced them. Yet the arrangement o tunnel vaults perpendicular to the walls was retained in the transept. These works could only change the stability of the edifice built of materials of small dimensions; so much that (some years since) it was necessary to rebuild t the high vaults in light materials and to restore the lower parts. These works unfortunately have caused the disappearance of the various traces of the primitive arrangement. Yet one s still sees at several points the imposts S of the transverse arches of the primitive side aisles.

This example of a nave built at the beginning of the 11 th century indicates a first effort to leave the system of the antique Roman basilica. Clusters of little columns replace the single columns, and vaults already bear the floor of the upper gallery. Yet these great walls not being connected in their extent, except at the top by the tiebeams of the carpentry; they were not constructed with the excellent materials and mortar employed by the Romans; they frequently buckled or leaned to o one or the other side. Their appearance did not fail to be cold, and the paintings ornamenting them being seen obliquely, dusty in time, soon lost their splendor. The carpentry at that height could only be repaired with difficulty, and if it caught fire, the entire edifice was lost. They men thought of frankly dividing the naves in visible bays, accented by great transverse a arches. Another edifice of the middle of the 11 th century furnishes us with an example of this new system. This is the church of Notre Dame du Pre at Mans. In the nave of that edifice each bay comprises two arches (Fig. 2). A great pier of rectangular section, flanked by engaged columns, alternates with a cylindrical pier. At each of the great piers A is turned a transverse arch B. A carpentry truss is placed at the cylindrical pier C. The side aisles are covered by cross vaults with transverse arches resting on the engaged columns of the great piers and on the capitals of the cylindrical piers. The rafters of the carpentry are placed lengthwise like joists, and rest on the gables of the great transverse arches B and on the intermediate trusses. Those timbers are more or less decorated, having plank interjoists, forming a ceiling under the roofing. At F is represented one of the gables of the great transverse

arches with the ceiling.[1] There is every reason to admit that the nave of the cathedral of Mans was originally built on this principle. At Notre Dame du Pre,.vaults were rebuilt in the 14 th century under the old carpentry, suppressing a part of the primitive transverse arches, whose traces are easily found. Thus taking two arches of the nave to make one bay, there results a plan, square or approximately so, i.e., the space A A was equal or nearly so to the width of the principal nave; so that if one desired to definitely vault this nave it was entirely simple to adopt at first a vault on a square plan with an intermediate transverse arch; i.e., a vault giving in horizontal projection the plan sketched at P (Fig. 2; hexapartite). Then the transverse arches a b, c d, were only the reproduction of the transverse arches of the great piers, and the intermediate transverse arch e f replaced the carpentry truss; the diagonal arches a d, c b, supported the compartments of the vaults turned in the p place occupied by the ceiling. But before passing beyond the e examination of the developments of this principle, it is necessary to mention a system of bays resulting from another metnod of construction.

The Romans had no only adopted for the construction of great halls the system of rows of columns supporteng walls over lintels relieved by arches sank in thick walls: they had erected on isolated piers those widely spaces, great archivolts bearing the longitudinal walls. Tunnel vaults were concentric with those archivolts and covered the side aisles, the carpentry of vaults (as at the basilica of Constantine at Rome) covered the principal nave. The late empire had built edifices in great n number after this system, sometimes retaining the carpentry on the central aisle, as proved by certain basilicas of southern Syria. From that system was derived after the first centuries of Christianity a mixed mode, which consisted in dividing the great square bays into two arches, supporting cross vaults over the side aisles, whose widths were nearly equal to half that of the principal aisle. On this plan was conceived at Milan the celebrated church of S. Ambrose, after the end of the 9 th century; at least the fact seems probable.[1] Now this type was a adopted in the construction of a great number of Carlovingian churches, notably on the banks of the Rhine, and was continued until the 13 th century.

Note 1.p.242. This arrangement was adopted in the church of S. Miniato near Florence; it was quite common in the middle of the 11 th century in **our** northern provinces, and notably in Champagne.

Note 1.p.243. On this subject see Etude sur l'architecture lombarde by M. de Dortein, engineer of bridges and roads. However, if we do no contest the age of the arrangement of the p plan of the church of S. Ambrose of Milan, it seems to us that the author of that excellent work in the notice that he gives of that church, does not sufficiently take into account the restorations, that it had to suffer, and that he depends on the t texts in too obsolute a manner. For example, how many edifices do we not have in France, whose nearly total reconstruction is only mentioned incidentally, or not at all! No text mentions t the reconstruction of the facade of Notre Dame of Paris, among others; is it necessary to conclude that this facade is that of Etienne of Garlande in 1140, or dates from the episcopate of Maurice de Sully (1160 - 1190)? After the great disaster of 11 1196, i.e., after the ruin of the vaults of the church of S. A Ambrose of Milan, that monument must suffer an almost total rebuilding. Vaults do not fall without a cause; such a grave disaster is generally the result of a leaning of the piers; now t the existing piers of S. Ambrose do not appear to have suffered alterations of a nature to have caused the fall of the greater vaults. From the examination which we made of this edifice a few years since, it results that we could not assign to its nave the date of the 9 th century (not including the vaults). The mouldings, the sculptures and all the upper parts, even t the construction of those parts, seem to belong to the 12 th c century, a brilliant epoch for art in Lombardy as in France. Monuments erected on the soil of north Italy, and whose Carlovingian date cannot be debated, have a barbarous character in construction, that is not found in S. Ambrose of Milan. Yet, we repeat and indeed believe, like M. de Dortein, that the arrangement of the plan belongs to the 9 th century, as well as a part of the lower structures, the altar, etc.

As in the example just given (Fig. 2), each bay of the Carlovingian church of the Rhine consists of two great piers and an intermediate pier of smaller section; but this intermediate pier bears only the transverse arch of the vaults of the side

aisle and fulfils no function next the principal nave. The bay that we present here (Fig. 3) of the nave of the cathedral of Worms, a nave that dates from the middle of the 12 th century, sufficiently explains this system. A great square cross vault A with ribs covers each bay of the nave without an intermediate transverse arch; and the pier B is placed there only to obtain two Roman cross vaults over the side aisle. The question was to have square areas, or approximately so, in covering the vaults, that is always derived from the Roman tradition; now the side aisles having a width of about half the width of the nave, it was necessa y to double the piers in order to have square areas in the side aisles as in the nave. The sketch T relieves us from long explanations of this matter. The necessity of vaulting great edifices, basilicas and churches, was recognized everywhere in the West, both in north Italy and France and also on the banks of the Rhine; yet the different schools of art in those countries did not solve the problem in the same fashion. To consider matters in only a general manner, the school that we term Carlovingian, and which was chiefly inspired by the Roman architecture of the late time, had in view only the Roman vault, tunnel, cross or dome; that school abandoned that tradition only when it adopted the system of construction imported from France about the middle of the 13 th century. The French school proper on the contrary, abandoned early the system of Roman vaults, sought and found something else; all is there. If one discovers in Lombardy or elsewhere square piers with engaged columns and archivolts in the aisles, some details of decoration analogous to, or preceding our French Romanesque architecture, and one concludes from this that we have taken from others this Romanesque architecture,, we do not see that great interest attaches to that priority. Each drew from the common Latin stock for the arts as for the languages of the West from the 8 th to the 11 th centuries; but if one shows elsewhere t than on France, and north of the Loire before 1130 a system of vaults, like that adopted in the structures of Vezelay after the beginning of the 12 th century, and at S. Denis in 1140, t then we shall be the first to recognize what it is desired to prove to us in France, viz:- that we have never possessed a n native architecture, no more in the 12 th than in the 19 th centuries.

Until this proof is made, we shall continue to repeat; there is no original architecture except that based on a new principle, one not before accepted. The system of vaults introduced in France north of the Loire from 1130 to 1150 is found nowhere before that epoch; this system is not merely a form, then novel or a procedure; it is entirely a principle that extends to the different parts constituting an edifice, and that compels the coordination of those parts according to certain laws deduced logically; then the architecture introduced in France from 1130 to 1150 was truly new then and without precedents, independent of forms accepted until then; thus this architecture can be termed French for the best reason. [1] Leave for the moment the system of Rhenish naves, and resume the study of edifices belonging to our schools. We have jus seen (Fig. 2) a bay composed of two great piers bearing transverse arches over the p principal nave, with a weaker intermediate pier, dividing the side aisle to be able to cover it by square vaults, and supporting a carpentry truss over that principal aisle to diminish t the span of the wooden ceiling. Let us see how a system later than that of Fig. 2, belonging to another province, where the piers are equal and divide the side aisle in vaults on square plans, giving on the central nave rectangular plans, that men have claimed to vault according to a principle already entirely foreign to the Roman system. This refers to the nave of the abbey church of Vezelay (Fig. 4); the first years of the 12 th century. This nave, one bay of which we give at A, possesses transverse arches over the side aisles as over the high portion, at each pier of section drawn at B. Those arches are round like the side arches, and although the imposts of the latter are stilted, yet their crowns do not reach the crown of the transverse arches. It results from this that to turn the high vault in each bay and not cause penetrations, but an appearance of a cr cross vault, it was necessary to experiment and to seek ellipsoidal forms, that could not be drawn geometrically. This was a first attempt toward a form of vaults not yet accepted. Thirty years later and about 1132 was erected the porch of the same church (see at P, Fig. 4); the bays of this narthex, a little wider than those of the nave, rest on piers with sections similar to those at B. Just ar in the nave, transverse arches are turned at each pier, both on the central part and on the

side arches have their imposts at the same level as those of the transverse arches. It results from this, that the bay being rectangular, the crowns of these side arches are much below t the crowns of these transverse arches. The vault covering this space is annular from one transverse arch to the other, penetrated by ellipsoids, and of which the side arches are sections. That could be defined geometrically, and this system presents a perfect stability. Besides, rampant cross vaults are turned over the galleries of the second story ? and perfectly abut t the central vault. Two of the vaults of this porch, of the same epoch as the others, already possess pointed arches. The constructor in closing these vaults according to the method just indicated (Fig. 4, P) indeed felt that while approaching an e ellipsoidal body, yet they possessed convex groins (these vaults being built of irregular rubble) maintained only by the adhesion of the mortar; that consequently he had to turn beneath those groins the permanent arches of stone, replacing the temporary centres of carpentry intended for setting them. That was an advance toward the pointed cross vault. But returning to our Fig. 2, in other provinces men derived from this mixed system of arches and wooden ceilings a complete system of vaults on an entirely novel principle, a method that must soon unite with that introduced in the porch of the abbey church of Vezelay. In 1150 bishop Baudoin II, it is stated, undertook the rebuilding of the cathedral of Noyon, that was completed before the end of the 12 th century. In 1293 a violent conflagration reduced to ashes the city and cathedral of Noyon, according to the chronicle. It is clear that only the carpentry was burned and that the vaults were perhaps altered. Thus the vaults of the nave, as indicated by the profiles of the arches and their style of construction, belong to the last epoch. At the origin, i.e., in the 12 th century those vaults, like many others dating from that epoch had their pointed arches turned between a alternate piers with a simple intermediate transverse arch. (Fig. 5). The intermediate pier in Fig. 2 only supports the carpentry truss bisecting the space between the transverse arches, but then separated the transverse arch intended to replace the carpentry truss. The diagonal arches (Fig. 5) were turned from one great pier to another. The bay was also constructed like that of Fig. 2. I. e., the intermediate pier A,

intended to bear a simple transverse arch of the great vaults, was more slender than the piers B supporting the principal transverse and diagonal arches. That was according to logic. Then the arches resting on the piers B alone were abutted by flying buttresses. The section C of the nave and of the side aisles completes the knowledge of that system of construction. Most of the first vaults built on this principle adopted in the 12 th century, are so drawn in Isle-de-France. The bay of the central nave is equal, or very nearly so, to the width of the same nave, but it is disected by means of an intermediate pier, that serves to bear the arches of the vaults of the side aisle and to intersect the diagonal arches of the high vaults.

Note 1.p.246. M. Vitet wrote thus in 1845:-- "Let all those that these questions inspire with a serious interest, cease to attempt to prove, some that the pointed arch came to us from the Orient, others that it is indigenous; what empty and idle quarrels! Let them seek who put into execution the pointed system, why the influence of that system has been so great and so universal, how that during three centuries it exercised over half Europe an absolute sovereignty; finally, let them seek if the birth and progress of that system are not inseparably connected with the regeneration of modern society, the first germs of which the 12 th century saw unfold. Architectural revolutions thus examined are no longer confounded with those futile and ephemeral fancies, that prefer a certain material to any other for a certain time; they are serious, veritable revolutions, and express ideas." Monographie de Notre Dame de Noyon. p.130.

Note 1.p.248. Art. Construction, Fig. 19. Section of this porch. Arts. Porche and Ogive, Figs. 3, 4, 5.

Note 2.p.248. See the section.

But this system, justified by such a vast structure, was scarcely admissible for small edifices. The intermediate piers in the latter monuments would have been too slender, useless and encumbering. The architects suppressed them, retained only the principal piers A (Fig. 6), but still constructed the vaults a according to the principle just indicated. This last bay belongs to the little church of Vesle near Isle-Adam, and shows how the constructor has only erected the pier intended to support the intermediate transverse arch on the crown of the archivolt of the side aisle,[1] because it was useless in fact to rest that

intermediate pier on the ground. At B is drawn the section of that bay, and at D is the detail of the bases of the little columns on the capitals of the cylindrical piers. These two examples belong to two edifices of very different dimensions, but erected at nearly the same epoch, and emphasize one of the principal qualities of that beautiful French architecture of the end of the 12 th century, the unity of scale.[2] The spacing of the piers, height of the galleries of passage G, widths of the bays, members of the mouldings, are nearly the same in the two monuments. We can perceive these analogies in the cathedrals of Paris, Senlis, Soissons and Laon, in the churches of S. Leu d'Esserent, of Braisne, etc.[3] Let us now examine a bay of the nave of one of the largest monuments of the beginning of the 13 th century, the cathedral of Bourges.[4] This interior comprises a central nave and double side aisles with vaults at different levels. Thus (Fig. 7) the vaults of the first side aisle are turned at the level A, and those of the second side aisle at the level B, from which it results that the central nave is lighted by the windows C, pierced above the roof covering the vaults of the second side aisle. In the height of this roof extends a gallery for passage D, just as there exists a second at E, above t the vaults of the first side aisle. These vaults are constructed according to the system previously described; and one will observe that the piers G, which bear only the transverse arches of the intersection are less in diameter than those at H, that bear the transverse and diagonal arches.

Note 1.p.250. The construction of the church of Nesle dates from about 1175. This edifice is contemporaneous with the cathedral of Senlis and the abbey church of S. Leu d'Esserent.

Note 2.p.250. Art. Echelle.

Note 3.p.250. Art. Cathedrale, Fig. 4, one bay of Notre Dame of Paris.

Note 4. Art. Cathedrale, Fig. 8, plan of that church; Art. Proportion, Fig. 7, its section.

The beautiful arrangement of the nave of the cathedral of Bourges with its very high first side aisle, an arrangement s scarcely repeated in France except around the choir of the cathedral of Mans,[1] is evidently inspired by the churches of P Poitou. It is a compromise between the systems of construction of the naves of that province and of Ile-de-France. The central

nave of the cathedral of Bourges receives light in its upper part above the roofs of the side aisles, like the naves of our churches of Ile-de-France, which did not occur in the cathedral of Poitiers; but the inner side aisle beneath its vaults includes a considerable height, and is no longer equal in height to the second side aisle, as at Notre Dame of Paris, around the choir of Notre Dame of Chartres, and Cologne.

Note 1.p.253. Art. Cathedrale, Fig. 35.

In fact here is one bay of the nave of the cathedral of Poitiers, whose construction was a little earlier than that of the cathedral of Bourges, otherwise conforms to the Romanesque traditions of Poitou and Vendee, and accents the importance of the side aisle in these edifices. [2] Our Fig. 3 assumes at A the section made on the longitudinal axis of the side aisle, and at B on the axis of the central nave. The vaults of the side aisles are abutted by close flying buttresses and abut the high vaults. These side aisles are each nearly equal in width to the nave, so that this interior is rather a great hall with three aisles, than a church following the tradition of the transformed basilica. The arcade supports at the level C a sort of balcony, or continuous gallery, that passes behind each pier in the thickness of the buttresses. A single roof in two slopes c covers the nave and i s side aisles. This structure was built with much care and is remarkable for its beautiful proportions and the happy concord of all its parts. The vaults are drawn a according to the method of Poitou and of Anjou, and partake of the dome and of the cross vault. (Art. Voute). In this composition is an emplitude, reason and sobriety, that are the true marks of power in the artist. This mixture of superior qualities, too rare today, is found in the composition of the bays of naves vaulted from 1150 to 1250, whether these interiors were destined for religious or civil uses. After the design of the transverse section, in fact the bay determines the proportions and appearance of an interior, with or without side aisles. Now those wide bays of the monuments of Poitou, Anjou, Maine a and Angoumois, are surprising by their grand arrangement, although most of those structures are of mediocre dimensions. To appear great is certainly a quality for an interior destined to contain a multitude. One finds himself at his ease, even when space is materially lacking. The cathedral of Poitiers is of

mediocre dimensions, [1] and still by the beautiful arrangement of its wide bays, the impression left by it is that of a very vast interior.

Note 1.p.253. Art. Cathedrale, Fig. 35.

Note 2.pp253. Art. Cathedrale, Figs. 44, 45; plan and transverse section of the cathedral of Poitiers.

Note 1.p.254. Art. Cathedrale, Fig. 44. See its plan.

Certain churches of the same provinces, of Maine and Anjou, consist of interiors with a single aisle, and there again the composition of the bays is broadly understood. Among others, we shall cite the nave of the abbey church of Notre Dame de la C Couliere at Mans (end of 12 th century), divided in bays of s square plan with raised balcony, as at the cathedral of Poitiers, [1] supported on great releiving arches of beautiful effect. Here (Fig. 9) is one bay of that nave, without the side aisles. One need not be an architectto comprehend the system, from which can be derived this grand and simple arrangement, lending itself to all modes of construction. [1] The influence of this system of wide vaulted bays, single or with side aisles almost equal to the central nave, scarcely extends from Maine and Perry to the North; and as we have just stated, one can find a l last memorial of it in the composition of the bays of the cathedral of Bourges. On this side of the Loire, the system indicated in the examples that we have given (Figs. 5 and 6) persists during the 13 th century, but except in very rare cases, men a abandoned then the system of vaults with intermediate transverse arches, intersecting the diagonal arches, i.e., instead of being double, the bays are single and each has its own vault. Is it not evident that there pervades in these conceptions of bays during the period between 1130 and 1230 a freedom, whose value and extent cannot be ignored? No other architecture lent itself to forms and appearances so varied without abandoning t the principles that directed it. Now is not that flexibility the result of the system of construction adopted? And since th this system of construction harmonizes itself with liberty and leads to it, is it necessary to conclude that this architecture is nothing but a superannuated procedure, having no application today? Will not the attentive study of proportions be emphasized by the different examples, that have just passed under the eyes of our readers?

Note 1.p.255. An anologous arrangement exists in the nave of the abbey church of S. Radegonde at Poitiers, and existed in the 12 th century in the nave of the cathedral of Bordeaux.

Note 1.p.256. At A is sketched the plan of the pier with the passage at the level a.

Dating from about 1220, the bay of naves with side aisles in the edifices of the North is determined in a more precise manner. The piers are equal in thickness, and each bears the complete ribs af the cross vaults, upper and lower; the walls between those vaults are opened widely, and are even replaced by windows, that occupy the entire surface between the piers and side arches. According to this principleis conceived the nave of the cathedral of Amiens, built between 1220 and 1230. [2] We give (Fig. 10) a bay of that nave, tha is no less than 139.4 ft. under the crown. The plan of the piers at the level of the ground story is sketched at D, and at the level of the gallery (triforium) at C. That gallery is closed by a thin wall V, attached to which is the shed roof that covers the side aisle. One sees at G the window of the side aisle, that erected on an arcade and a supporting wall comprises the entire surface existing between the engaged piers and the side arch. The same system for the upper windows F. They soon desired to suppress even the solid wall forming the triforium behind the roof of the s side aisle; [4] the thin walls M were perforated, and the roofs covering the side aisles were placed as hip roofs over each lower vault, with gutters on the flying buttresses. Then the upper window was joined to the triforium, and the tracery extended down into the gallery. According to this principle was rebuilt in 1240 the nave of the abbey church of S. Denis, the choir of the cathedrals of Troyes and of Beauvais, and a little later (about 1260) that of the cathedral of Sees, of which we sketch one bay at A (Fig. 11)! [4] The floor of the choir is at the level B and that of the side aisle at C. The gallery (triforium) under the high window is perforated up to the height of a sill D, behind which passes the gutter. The lower tracery of that gallery does not reproduce exactly the design of the front arcade (Art. Triforium). As at the cathedral of Amiens, all the spaces left between the piers beneath the vaults are filled by windows decorated by stained glass; thus these bays present a considerable area of translucent painting

with the most brilliant effect. At O is given the section of a pier of oval plan, in order to leave to the voids the largest possible areas. Always according to these principles was constructed in the 14 th century the nave of the abbey church of S. Ouen at Rouen (Fig. 11), one bay of which is presented at R.

Note 3.p.245. Because of the lack of space and to retain the same scale as that of the preceding (1 : 200), our Fig. divides the bay into two parts. The part P surmounts the part A in execution.

Note 4.p.256. Art. Architecture religieuse, Fig. 36.

Note 1.p.259. Bay of the parallel parts of the choir.

These three last examples show how the masters of works tended to diminish the solids and increase the areas of glass in vaulted churches. This principle was scarcely modified until t the 16 th century; the portions of the cathedrals of Auxerre, Troyes, Sens and Beauvais, that date from the 15 th and 16 th centuries, reproduce except in details the system, that we see adopted in the 14 th century at S. Ouen of Rouen. Besides, this system perfectly suits in our climate very great interiors. By the colored or grisaille glass, the effect of the rays of the sun was lessened, and yet a warm and soft light penetrated everywhere, that left no point dark. The distribution of the light in the great covered and enclosed spaces is a difficulty, against which the merit of our modern architects is injured. Thus most of the great halls built in our time have a cold and gloomy appearance. Large obscure places on the walls or the floor cu up those interiors, dwarf them to the eyes and do not lend themselves to decoration. Even the multitude scattered in those halls forms black spots with a disagreeably aspect. On the contrary, in the midst of these old edifices entirely opened between the principal members of the structure, there circulates asort of luminous and colored atmosphere, which satisfies the eyes as well as the mind. One finds at ease in thesevast frames that partake of the external light while softening it. It is to this judicious introduction of luminous rays, that these interiors mus appear much larger than they really are. Thus the abbey church of S. Ouen, that is really of very ordinary dimensions, [2] seems to rival our great cathedrals.

Note 2.p.259. Art. Architecture religieuse, Fig. 62.

An account s rendered of the arrangement of bays of the halls

of palaces and castles by referring to Arts. Construction, Palais, Salle.

TREFLE. Trefoil.

Name given to an architectural member of geometrical form ob obtained by means of three circles, whose centres are placed at the vertices of an equilateral triangle. Wen also say trilobed ((Fig. 1). From the end of the 12 th to the 16 th centuries, this figure was much used in the composition of tracery, rose windows, arcades, and generally in openings. Sometimes the points of intersection of the circles are terminated by a leaf ornament, A, by a human or animal head.

It often occurs that a trefoil encloses three other trefoils, as indicated by the sketch B. (Arts. Balustrade, Meneau, Rose).

Some authors have desired to see a symbol in that figure. N Nothing supports that opinion. The trefoil quite naturally results from the very frequent use of the equilateral triangle in the architecture of the middle ages as a generating figure. (Art. Proportion). It had the advantage, for example, for the openings of tracery, of being easily inscribed within an equilateral arch a b of the figures produced by the equilateral triangle.

TREILLAGE. Lattice-Work. Trellis.

An opening composed of laths or slight peeces of wood connected together during the middle ages by nails or wooden pins; th then about the end of the 15 th century by iron wire.

Already about the end of the 12 th century, trellises were established in private gardens, and under S. Louis this mode of forming tunnel ceilings with vines was very common. At that epoch the trellises of the garden of the palace on the site of the present place Dauphine were in great reputation. Trellises then generally consisted, if one can refer to the vignettes of manuscripts, of crossed flexible strips of wood held by nails or wollow ties sometimes interlaced. The fashion of latticed architecture does not appear to date before the beginning of the 16 th century. This was an Italian importation, and not one of the happiest.

TREILLIS. Grating. Grille.

TREILLIS. Grating. Grille. Lattice.

A closure of ligh iron bars, very close, a sort of grille (Art. Grille), but capabce of opposing a serious resistance. It is frequently a question in the romances of the 13 th and 14 th centuries, of windows so lattcide externally in apermanent manner (Art. Grille). Thus the name of trellis was given to g grilles in the form of fences to defend the counterscarp of the ditches of castles. "All around Plessis, he (Louis XII caused to be built a fence of great bars of iron, planting in the wall iron spits with several points, as at the entrance whereby one could enter the ditches of the said Plessis." [1]

Note 1.p.261. Mem. de Phillipe de Commines. Book VI. Chap.7.

TRESOR. Treasury.

A room reserved beside abbey churches and cathedrals, also in castles, to contain the most precious objects, such as consecrated vessels, reliquaries, articles of goldsmith's work, then also charters, deeds, etc.

The cathedral of Paris had its treasury over the sacristy. (Arts. Sacristie, Palais). The S. Chapelle of the palace at P Paris likewise possessed a pretty annexed edifice, that contained the treastury of charters. Also at the chapel of the castle of Vincennes (Art. Chapelle). Also frequently the treasuries of churches were constructed in the interior itself of the edifice. One still sees at the cathedral of Rheims in the side aisle of the southern transept the mezzanine treasury enclosed by a grille, that contained the beautiful objects possessed by the chapter of that church. At the cathedral of Rouen and in that of Evreux, the treasury is only a grated chapel. At Sens and Troyes the treasuries of the cathedrals are attached to t the church at the south side of the choir, and are reached by stairs opening in the side aisle. In castles the treasuries of charters were placed in the keep, and those of the vessels in a tower near the great hall, that of the chapel being beside or over the sacristy. These treasuries were habitually vaulted and therefore protected from fire, being lighted only by windows elevated above the ground and carefully grated. Their doors were of iron and doubled, or at least were furnished with two fastenings. There is still seen in the mansion of Jacques Coeur at Bourges the room, that served as a treasury.

The custom of arranging in castles or mansions rooms particularly intended for the preservation of treasures, and especially of the archives, does not appear among lay lords to precede Philip August. Until then it was the custom among the nobles to carry everywhere with them their precious deeds and most of t the precious objects that they possessed. That was a Merovingian habit widely extended among all peoples of Indo-European r race. The chiel only trusted himself alone to care for his property and his family, and during the Roman epoch armies of barbarians marched only where accompanied by heavy wagons, that carried old men, women and children, and the spoils collected in war. During the campaign of 1194 against Richard, the baggage of Philip August fell into an ambuscade placed near Freteval in Vendomois by the king of England, who thus laid hands o not only on the vessels and jewels of his rival, but also on the registers of quit rents, vassalage and servitude, "in brief the complete archives of France, that the kings were accustomed to carry with them in all their bourneys. The chronicles of S. Denis state, that it was a hard task to repair this loss a and to restore everything to its legitimate state." [1] After that event the French kings deposited the registers of the State in a fixed residence. The charter room of France was placed in the Temple at first, then a part was transferred to the great tower of the Louvre, and a part to the treasury of S. Chapelle, of which we have spoken above.

Note 1.262. Chronique de S. Denis (Histoire de France by M. Henry Mortin. Vol. III. p. 551.

TRIBUNE. Tribune. Gallery. Apse.

A principal part of sacred edifices according to the academicians de la Crusca. In fact in the primitive Christian basilicas, the tribune is the semicircle forming the apse, where w was the bishop or abbot surrounded by his clergy (Arts. Choeur, Transsept), in memory of the place occupied by the pretor in the antique Roman basilica. The Fathers of the Church sometimes give the name of tribunal to one of the ambos placed at the s sides of the choir, notably to that on which was read the gospel to the believers assembled in the aisles. [1]

Note 1.p.263. Also in 1527 at the council of Lyons:- (Latin quotation).

The top of the rood loft, where was likewise read to gospel, and from which believers were instructed, thenceforth took the name of tribune. By extension the name of tribune (gallery) in the church was given to every part elevated above the floor, either on columns and arches or on corbellings. [2] Thus those religious edifices had their rood lofts, galleries for the organ, clock and the treasury; sometimes also private galleries reserved for some privileged believers, great personages, families of founders, etc. Men ascended to these galleries raised above the pavement by stairs opening either into the church or in adjacent buildings, when they are private, i.e., reserved for certain personages. Galleries were also a means of increasing the areas assigned to believers in little churches. We have to occupy ourselves here only with galleries included as internal and elevated annexes of churches, not as sanctuaries, ambos or rood lofts. (Arts. Jube, Choeur). Now the use of galleries dates back very far. Galbert relates how in 1127, Charles the Good was assassinated in the gallery to which he had ascended to pray with Thancmar, castellan of Bourbourg; a gallery made in church S. Donatien at Bruges. The bodies of these two personages having been transferred into the choir by the religious to be interred, the party that had committed the murder resolved to carry them away:- "The following night the provost ordered the church to be supplied with arms and sentinels to be in the gallery (solarium) of the tower, so that he could retire there with his men in case of an attack by the citizens. According to the order of the provost, armed knights on that night entered into the gallery of the church. [3] Those miserable men (the partisans) not being able to take possession of the lower parts of the church, had barricaded with timbers and stones the stairs leading to the gallery, so that no one could ascend there, and they could not descend, and they only sought to defend themselves from the height of the gallery and from the tower. They had established their places between the columns of the gallery, with piles of boxes and benches, from which they cast stones, lead, and all sorts of heavy articles on those that attacked. Finally, the canons of the church ascended from the choir into the gallery by ladders." [4] These curious passages show that the gallery in question was placed beneath the tower of the church, that it had stairs communicating with

external buildings, and that it was near the choir. It was a room in the second story opening into the church by open arches, like the upper galleries of the side aisles of our churches of the 11 th and 12 th centuries. If that room served as a gallery, i.e., as an oratory elevated above the floor of the church, it did not have the entirely exceptional form that we now attach to that part of the religious edifice.

Note 2.p.263. In Latin, solorium.

Note 3.p.263. Golbert, Vie de Chorles le Bon, translated by M. Guizot.

Note 4.p.263. The same. Chop. 14.

A gallery of a very frank character and of a very early epoch (about 1130) is seen in the narthex of the abbey church of Vezelay. [1] We find another in the little church of Montreal, set back against the facade and looking toward the choir, whose a arrangement is very remarkable. Fig. 1 presents at A the plan of that gallery, and B is the section made on a b. One ascends to that gallery by two stairs opening in the side aisles, made within the stone of the front wall. Entirely constructed of hard stone, it rests on a twin monolithic column and four great corbels composed of long projecting stones corbelled.

Note 1.p.264. Art. Porche, Fig. 4.

The arrangement of the column with corbels is extremely interesting in construction, because combined with the mullion of the doorway. [2] An altar table supported on a solid balustrade and on a single twin column, is placed on the axis of the gallery at C. The tails of the voussoirs D of the archivolt of the doorway and the tympanum E naturally separate downward the entrance doors P of the gallery. A rose window in excellent style opens at G below the vaults of the nave. Fig. 2 gives the perspective view of that gallery, taken from the nave. This work was conceived and erected at the same time as the facade, which dates from the end of the 12 th century, since the construction of the corbelling is intimately connected with that facade, a and that the two stairs were reserved in the wall in building it. The church of Montreal is small, and it is terminated by a square sanctuary with a transverse aisle and two little chapels, also on a square plan and orientated. The gallery can easily c contain 20 to 25 persons, and thus adds to its area. Perhaps it was reserved for the lord, for the church was attached to a

castle of which remain no traces. The position of the little a altar makes this believed. This gallery could thus serve as a private chapel. Constructed of magnificent materials cut with remarkable purity, this church and its (so rare) gallery, among the monuments of Burgundy, is one of those presenting the greatest interest.

Note 2.p.264. Art. Poste, Figs. 63, 64.

Everyone knows the gallery of the cathedral of Paris, that in the interior rises beneath the great western rose window between the two towers, and whose arch serves as a shore at the bases of those towers. This gallery was constructed at the same time as the lower part of the facade, and consequently dates about 1210, and serves todan for the front of the great organ. It c consists only on an arch that spans the entire width of the centre aisle, and of a cross vault. It width it occupies half the depth of the towers and connects the beautiful vaulted halls in the second stories of those towers by wide arches. Two other similar arches open into those halls and directly into the nave.

We snall here speak only of the halls of the second story, of porches or bell towers placed on the axes of the principal aisles, and that open into those naves and are actual galleries, because we have occasion elsewhere to mention these arrangements.[1]

Note 1.p.267. Arts. Clocher, Porte.

In the 14 th century were erected in the interior of the cathedral of Laon, three galleries below the gables of the western facade and those of the two transepts, to shore the piers of t the 6 towers, that flank these gables. These three galleries have no definite purpose, but this is an utilized means of strengthening. They consist simply of a raised arch and cross vaulttured between the piers of the first bay. During the second half of the 15 th century, a gallery was erected in the first bay of the nave of the cathedral of Autun. [2] This gallery was designed to carry an organ front, and is arranged on the original plan as shown at A, Fig. 3. It occupies a trapezoid abcd, whose angles b, c, are abutted by the arches b,f, c e. The vault with diagonal arches, ribs, liernes, etc., is complex and quite flat! This is a well conceived construction of the old piers that one claims to modify. One reaches the floor of the gallery by two old screw stairs, that originally gave access

to a sort of external loggia, which was replaced by a beautiful porch [3] about the end of the 12 th century. The perspective v view of this gallery exhibits its construction and character. At B is one of the two flying buttresses that resist the thrust of the vault, whose head arch b c is borne on the two keystones of the oblique joints b and c. There is a combination very simple in its principle, from which can be derived an excellent m method. The cusps and pendants add nothing to the stability and are not in the best style, applied to construction in stone.

Note 2.p.267. The construction of the cathedral of Autun dotes in the 12 th century. Art. Cathedrale. Fig. 27).

Note 3.p.267. Art. Porche. Figs. 12, 13.

Independently of these open galleries, built to receive singers, organs or a privileged public, there were sometimes made in abbey or parish churches little closed galleries, especially in the chapels of castles, designed for certain personages. This custom became common during the 1; th century. The abbots no longer descended to the choir, but had their gallery. The lords also had their special gallery, either in the parish church or in their own chapels.

Here (Fig. 4) is one of these little closed bays built in the front wall of the side aisle of the abbey church of Montvilliers. This church is Romanesque; but in the 15 th century, a side aisle was rebuilt, in the wall of which is arranged a bay. [4] At A is traced the plan of the bay with the stairs leading to it, and at B is the elevation of the side aisle. This tracery was fitted inside with curtains, so that those present at the ceremonies could look into the church without being seen.

Note 4.p.267. These details were furnished to us by M. Protel, architect at Havre.

The service of the galleries sometimes assumed great importance in the chapels of castles. [1] One was arranged for the lord and his family, others for the occupants of the castle and the attendants. The garrison and all the servants stood on the pavement of the ground story. It sometimes occurred that these g galleries were made of wood. The great halls of castles likewise possessed this sort of galleries of joinery, painted and decorated by fabrics. There were placed musicians on feast days and banquets, ladies, or strangers which it was desired to honor

on days of hearings. This kind of gallery was erected in a corner of the hall, and was reached by external stairs.

Note 1.p.269. The royal chapel of Vincennes possesses a beautiful gallery beneath the westeen rose window, which consists of a pointed arch with cross vault spanning the width of the interior.

In the churches were also suspended wooden galleries to receive organs, choirs or privileged persons. At the cathedral of Rheims are still seen the remains of one of this sort of galleries attached to the north gable wall of the transept, and that dates from the 15 th century. Above the doorway of the principal entrance of the cathedral of Amiens also exists a wooden g gallery, whose construction dates at about 1500, and that rests on an armed truss, masked behind three wooden arches.

The church of S. Andoche of Saulieu still possesses a pretty wooden gallery of the end of the 15 th century above the central doorway. Fig. 5 gives a perspective elevation of it, taken from the interior of the nave.

At A is sketched the system of construction of these galleries of carpentry and joinery. The tiebeam B is halved to allow the kingpost C to pass, that rises to the beam D and receives the two principals E. Struts G relieve the intermediate pa parts of the tiebeam, their feet resting on the lateral walls at I and joined to the lower end of the kingpost C , fixed by the two principals E, and [a] decorated facing covers the tiebeam, and the balustrade joinery fixed from B to D stiffens the entire system. The joists rest on a beam fastened behind the tiebeam. An analogous system is applied at the cathedral of Amiens, although the span is much greater. [1] The carpentry truss forming the front of the gallery is divided in three bays (at P). The kingposts are likewise halved into the tiebeam H. The trapezoid K L M N supports the heads of the kingposts, that receive the feet of the struts O. The junction of the principals with the tiebeam is maintained by bolted stirrups, and by two struts K N. A triple arch in joinery appears suspended, conceals the kingposts and struts, and contributes stiffness to the whole. These arches standing on corbels in the air are not then a vain ornament, but the actual decoration of the carpentry structure.

Note 1.p.270. The span of the gallery of the church S. Ando-

Andoche of Saulieu is only 18.5 ft.; that of Amiens is 45.9 ft.
Men erected galleries on the places during public festivals, to place thereon singers and actors that recited the mysteries before the multitude. During tourneys, galleries of carpentry covered by fabrics and shields of arms were built at one side of the lists and served to shelter the lords and ladies. But these temporary works are outside the domain of architecture.

TRIFORIUM. Triforium.

A word in use in low Latin (formed from the Greek), introduced in the vocabulary of architecture by English archaeologists, a and that is applied to galleries extending internally around churches above the archivolts of the side aisles. [1] The triforium either occupies the entire width of the side aisle, or it is merely a narrow service gallery against the roofs of the s side aisles. Most of our great churches of the North possess a triforium, that is only a tradition of the gallery (ambulatory) of the second story of the Roman basilica. When the triforium occupies the entire width of the side aisle, it is vaulted after the beginning of the 12 th century, and from the origin i its function is determined more by a need of stability, than by the needs of the service of the church. As long as the naves of churches were covered by visible carpentry like the Roman basilica, if the architect erected a gallery in the second story, for example as at S. Remi of Rheims, [2] he could scarcely think of vaulting it; he contented himself with turning a transverse arch from each pier, that received the inclined rafters supporting the shed roof covering, that shored the great walls of t the nave, but which could only exert on those walls a thrust, that the weight of the upper parts could not neutralize. It was quite different , when men replaced the visible carpentry by v vaults, evey by tunnel vaults. Those vaults were soon weakened by the spreading of the walls under the action of their oblique pressure; it was necessary to think of maintaining those walls in their vertical planes. Then they had the idea of throwing lengthwise over the galleries of the second story a half tunnel vault or continuous flying buttress to abut the thrust of t the central tunnel vault. From the end of the 11 th century, the school of Auvergne arrived at this result, whose efficiency can be proved, if one visits the churches of Issoire, S. N

Nectaire, Notre Dame du Port at Clermont, S. Etienne of Nevers, and even of S. Sernin of Toulouse. The transverse arches of t the primitive galleries, (see Fig. 1 of Art. Travee), were retained, and the inclined wooden rafters were replaced by this half tunnel vault on which was directly laid the covering of tiles or stone slabs.

Note 1.p.272. See Du Conge, Glossoire.

Note 2.p.272. Art. Trovee, Fig. 1.

Fig 1 explains this modification of the primitive procedures. At A is again seen the bay of the gallery with its transverse arches at the piers, and its joists supporting the covering; at B the joists are replaced by a half tunnel vault abutting the continuous thrust of the central tunnel vault C. Besides, do n not forget, that before deciding to throw vaults over the high naves, they began by contenting themselves with transverse arches partly bearing the carpentry and the covering. [1] In the provinces where men did not at first dare to suppress the carpentry to substitute for it tunnel vaults between the transverse arches of the nave, it was natural to replace likewise the ceiling of the shed roofs of the galleries by half tunnel vaults. But this new system of construction obstructed the high windows, formerly pierced beneath the carpentry of the central naves. Thus the churches of Auvergne mentioned by us have none, while only little openings light the triforium.

Note 1.p.273. Art. Trovee, Fig. 2.

The tunnel vaults of the high naves were not all at first t trussed concentric with the transverse arches. One sees that in the naves covered by carpentry during the 11 th century, t the traysverse arch supported a gable with the opening, on the slopes of which rested the joists of the roof. [1] Then the transverse arch was left in its place as seen at D (Fig. 1), [2] turning the tunnel vault at D instead of the ceiling. The half t tunned vault E of the triforium abuts the arch H of the nave. The opening of the triforium is then at I. Yet one gains nothing by leaving the transverse arches of the central nave below the tunnel vault, which was only a tradition of a preceding arrangement of edifices covered by visible carpentry; then these transverse arches were raised so as to make their extrados concentric with the tunnel vault as seen at M. [3]

Note 1.p.274. Art. Trovee, Fig. 2.

Note 2.p.274. Section of the nave of church Notre Dame du P Port at Clermont.

Note 3.p.274. Arrangement of the nave of the church of Issoire.

Fig. 2 presents the perspective view of the triforium of the nave of the church of Issoire. In this nave, that dates from t the last years of the 11 th century, the bays are double, i.e., the engaged columns A and the transverse arches B exist only b between alternate piers; the pier C only being intended to receive the transverse arches and the imposts of the vaults of t the side aisles. But one sees at D a transverse arch of the g gallery as one exists at the piers A. At E is the springing of the continuous tunnel vault of the high nave, and through the arcade of the triforium at G is perceived the half tunnel vault, which abuts that central vault. The same arrangement is at Notre Dame du Port and at S. Etienne of Nevers. In these edifices the triforium has exactly the character suited to its purpose. The wall of the nave is perforated to profit by that gallery necessary to the stability of the monument, and that gives a l little light to the high vaults of the church. If this method was suitable for naves of moderate dimensions, -- the low windows of the side aisles then admitting sufficient light because of the small width of the interior, -- it was inadmissible in the construction of a great church, such as S. Sernin of Toulouse, provided with double side aisles; for in the last case, the central nave would have been left in obscurity. Not being able to open windows below the springings of the tunnel vaults, it was at least necessary for those of the gallery to be sufficiently high and wide to light that central nave through the arcades of the triforium; thus in this last edifice, the triforium takes an importance other than that at Issoire and Notre Dame du Port. This will be judged of by the elevation given h here (Fig. 3). At A is sketched the plan of this gallery with an angle pier B; for the triforium of the church S. Sernin returns at the ends of the transverse aisle. Wide windows C light both the gallery and the middle of the interior. The half tunnel vault with transverse arches, that springs above these windows, abuts the central tunnel vault, reinforced by transverse arches. This is the system adopted in the churches of Auvergne, but is more developed. 1

Note 1.p.277. In Art. Proportion, Fig. 2, see the transverse

section of the church S. Sernin of Toulouse. Also see Archives des monuments historiques, published under the auspices of the minister of Fine Arts.

Yet the development of the triforium in the church S. Sernin of Toulouse did not permit opening direct windows in the nave. Under the climate of the South, this means could suffice; but under the foggy sky of the North, the light transmitted by these second windows could scarcely light the high naves; it was necessary for the windows to open directly into these naves above the triforium. Thus in the provinces situated north of the Loire, men did not cease to make direct openings under the carpentry, and when they renounced the carpentry, beneath the vaults that must replace it. This was one of the causes that prevented the architects of the North from adopting the tunnel vault (Art. Voute), and which compelled them to seek combinations of the cross vault. The tympanums beneath the side arches of the vaults in fact permitted making openings in the heights of the vaults themselves. Yet they did not renounce the vaulted triforium, which was regarded as a means suitable to maintain the walls of the high naves in a vertical plane, and to abut the vaults surmounting them. Several churches of the epoch of transition show us various attempts made in this sense by the masters of the French provinces of the North. We shall cite in this place the abbey church of S. Germer, whose construction dates back in the last half of the 12 th century. [2] The bays of the choir of this church possess above the side aisle a triforium vaulted in the Roman way without diagonal arches. This gallery opens into the church by an arcade, and the roof surmounting it covers the flying buttresses intended to resist the thrust of the high vaults.

Note 2.p.277. The abbey church of S. Germer in construction is behind the abbey church of S. Denis and the cathedrals of Noyon, Senlis and Paris; it belongs to a less advanced school, that adheres to the Romanesque system in many points; because of that we place it here in the first line, if not by the date (for it was erected in 1160), but by the style.

The section (Fig. 4) made across that gallery explains the system of construction adopted. The half gables A B that rise on the flying buttresses also serve to bear the covering, that consists of joists with half trusses in the circular parts.

Openings C are pierced beneath thi shed roof and open into the church below a narrow service passage arranged at D, to facilitate the maintenance of the glass of the upper windows F.

Fig. 5 gives the internal elevation of this triforium with the rectangular windows E of the roof and the service passage G.[2] At H is sketched one of the parallel bays of the choir, and at L is one of the bays of the semicircle, developed on a rectilinear plan. One will observe that the opening with twin columns rests on a parapet wall (see the section in Fig. 4). This parapet wall prevents persons from occupying the gallery from looking down into the church, unless they lie flat on the sill wall.

Note 2.p.277. In Archives des monuments historiques, see Monogrophie de S. Germer, by M. Boeswilwold.

The architects of the cathedrals of Noyon, Senlis, Soissons, Paris, and the churches of Mantes, the choir of the abbey church of S. Remi of Rheims, and that of the abbey of EU, etc., r renounce this sill wall, and cause the bases of the columns of the openings to rest directly on the floor of the gallery. Balustrades of wood or of iron placed between these columns allow those present in the galleries to see the pavement of the church. The half Romanesque and half Gothic system adopted at S. Germer retains the high windows M (Fig. 5) of the primitive basilica, thanks to the application of the system of cross vaults with pointed arches, then entirely novel. [1] Yet those upper windows are very high above the pavement of the church, and l light little but the vaults; the windows pierced in the wall of the triforium (see section at P) were too far from the tracery to light the interior as the pavement; the more so that this triforium is low and deep, and the sill wall forms a screen. The architect of the choir of Notre Dame of Paris resolutely a adopted a different method; as we have just stated, he suppressed the sill wall and raised the vault of the triforium. The master that a little later, about 1195, erected the nave of t the same church, also improved the arrangements made by his p predecessor, from the point of view of introducing the light into the central part of the interior. He constructed the vaults of the triforium as transversely rampant, so as to completely show the windows of this gallery to the public on the floor of the church. In Art. Cathedrale (Figs. 2, 3, 4), we took into account that arrangement so clearly, that it is unnecessary

to return to it here. At Notre Dame of Paris, rose windows replace the rectangular windows, that in the church of S. Germen are opened in the wall against which leans the shed roof. The internal service passage that surmounts these windows at S. Germer, do not exist at Paris, but do exist at the cathedral of N Noyon; [2] and there is in the semicircular transept of the cathedral of Soissons as a second triforium, or narrow gallery with arched opening, that replaces the rose and rectangular windows.[3]

Note 1.p.280. Arts. Construction, Ogive, Trovee, Voute.

Note 2.p.280. Art. Trovee, Fig. 5.

Note 3.p.280. In Art. Architecture religieuse, see the perspective view of the beautiful vaulted triforium of the south t transept of the cathedral of Soissons. Also in Art. Construction, Figs. 41, 43, see the arrangement of the triforium of the choir of Notre Dame of Chalons-sur-Marne.

These wide vaulted triforiums were expensive in construction, and could only be appropriate for very great edifices. To find windows in the tympanums of the high vaults, they required an extra height of the walls to receive the shed roofs, that covered the galleries of the second story. Their utility only made itself felt during great solemnities, and only the two or three first rows of believers in the galleries could see what occurred in the church, even if the sill walls of stone were suppressed, as at Notre Dame of Paris, at Mantes and at S. Remi of Rheims. For churches built with more economy, and in which there was no occasion to receive a great multitude of the faithful, the vaulted triforium could not form a part of the programme. Thus the churches that date from the same epoch as those mentioned above, and that belonged to the same school of architects, were not provided with them. Yet we shall find in Ile-de-France a continued tendency to retain this system. It is no longer the vaulted gallery occupying the entire width of the side aisle, but no more than a triforium leaving a narrow gallery, a service passage within the abutting roof of the side aisles, as in the cathedrals of Rheims, Amiens, Bourges and Chartres. This intermediate system is adopted in the abbey church of S. Leu d'Esserent. [1] Here (Fig. 6) is the section of the triforium of the nave of that church. The wall receiving the roof A of the side aisle does not rise sufficiently to prevent the opening of little windows B. Without a vault, a relieving arch C recei-

receives the upper part of the wall, and the passage rests entirely on the vault of the side aisle. In the interior that arrangement presents the appearance reproduced in perspective in Fig. 7. As if to recall the vault of the grand triforium, the architect has turned the arch D, that is no more than a sham, since the true relieving arch is much lower and simply segmental (see the section). The triforium thus contracted has no n need of being covered by a shed roof, but simply by a slab G ((see the section), the high windows can be opened directly over the arch D (see Fig. 7), and even if the constructor had no a adhered to the construction of that arch, he could have placed the sill of the window much lower. It is well understood, that this system imperatively requires the construction of flying buttresses to maintain the upper vaults, for they no longer had to renounce the half gables within the shed roofs of the vaulted gallery, for fulfilling that function, as had been practised at S. Germer.

Note 1.p.281. This church dates from the first years of the 13 th century.

Another monument, contemporaneous with the church of S. Leu d'Esserent, gives both the vaulted gallery and the narrow triforium lighted by windows; this is the little church of Moret. The parallel parts of the choir of that church possessed a gallery in the second story or vaulted triforium over the aisle; but the semicircular apse without side aisle has above a row of low windows a triforium, whose original composition shows us a series of lunettes or rose windows without tracery, between which is arranged a passage. The perspective view (Fig. 7)bis) explains this irregular construction. At A is the triforium sketched according to the method of Ile-de-France, i.e., vaulted. A stairs placed behind the surface B ascends to the triforium of the apse, which is no more than a passage traversing the piers and opening by circular windows on the exterior and interior of the church. One notes that those windows (see plan at P) are not pierced normal to the curve of the apse, but are askew, so as to be seen from the entrance of the choir. Penetrating a cylinder, those eyes are never filled by tracery; their glass is set in the external circle, and is only maintained by iron bars. The details of this part of the church of Moret are in the best style of the first years of

the 13 th century. It should not be forgotten, that at the church of Mantes exists a wide vaulted gallery like that of the cathedral of Paris, lighted by circular windows, and that this gallery over the side aisle of the apse presents an arrangement, that although conceived according to very monumental ideas, appears to have furnished the scheme for the composition of that of Moret. The apsidal triforium of Mantes dates from the last years of the 12 th century. Either the architect desired to avoid the difficulties resulting from the combination of vaults on an annular plan, or he may have feared the thrust of these vaults on the exterior of the cylinder (a thrust at Notre Dame of Paris neutralized by a series of quite complicated flying buttresses erected on the second side aisle), because he had only one side aisle, and the construction was evidently executed with parsimony; the fact is that this architect vaulted the apsidal gallery of the church of Mantes by means of a series of convergent tunnel vaults. The section (Fig. 7) explains this system of construction; the columns A rest on the lower transverse arch; they represent lintels of hard stone on which rest the tunnel vaults B. But since these columns are set normal to the semicircle in plan, the bays are wider at the exterior C; it results from this that these tunnel vaults are either rampant or present skew curvilinear surfaces. The architect of Notre Dame of Mantes appears to have decided on the last arrangement after some experiments; i.e., he desired to maintain the crowns of the pointed tunnel vault at a level or nearly so. Th Then the trace a c of the tunnel vault is not concentric with the trace b d (see at M). The openings m are circular. It is clear that the architect of the church of Moret only had to express at a smaller scale what had been done at Mantes some years before him.

These examples of these varied deductions show how those masters continually sought to perfect what they saw done around t them. Without abandoning the principle adopted, and without f flatly imitating what seemed to present the most satisfactory results, on the contrary they claimed to develop that principle, to deduce from it all its consequences; and before all, they knew that a system of construction must be modified according to the dimensions of the edifices.

But in other provinces they proceeded differently; the trif-

triforium after the 13 th century was only an opening made in the wall receiving the roof of the side aisle; an opening allowing the eye to penetrate from the interior to beneath the carpentry. Yet at the origin, these openings were rather windows pierced at certain distances in the tympanums of the blind arcade, than of a gallery (Art. Travee, Fig. 2). Only about the middle of the 12 th century the blind arcade with windows opening under the roofs of the side aisles was transformed into a real window. The choir of the cathedral of Langres, that dates from that epoch, furnishes us with a beautiful example of those arcades opening in the wall receiving the carpentry of the side aisle. Fig. 8 gives the elevation and plan of the triforium of the cathedral of Langres, assuming the bay developed on a plane, that apse being circular. At A is traced the plan. The vault B is a pointed spherical vault penetrated by the high windows C. Little twin columns [1] support the double arch forming the gallery between the piers of the semicircle. This method could be adopted in an apse, where the bays are narrow. It would have been dangerous to rest wide and thick tympanums on a series of little columns. Those in the nave of the same church and triforium are only a blind arcade pierced by a middle opening in each bay. The same system was adopted at the cathedral of Autun, that is a little earlier than that of Langres. Yet the architects adhered to occupying the space between the archivolts of the side aisles of the high window openings; blind arcades only present . flat decoration without utility. The master to whom is due the cathedral of Sens, whose construction presents such interesting arrangements, had the idea about the end of the 12 th century, of establishing a triforium there according to a new principle. So as to well support the upper parts, originally composed of windows with a high sill and intermediate piers, he similarly divided the gallery into two bays with an intermediate pier resting on the crown of the archivolt of the side aisle. Then in each of the bays, he established twin arches resting on a little column and two jambs. Fig. 9 gives at A the plan and at B the elevation of the triforium of the nave of the cathedral of Sens. At C is the column that bears the transverse arch intersecting the high vault. Windows rebuilt after the fire at the end of the 13 th century have replaced the old openings D, which were doubled like the principal

arch of the triforium. That construction dates from about 1130, and shows us a triforium simply pierced in the wall requiring the roof of the side aisle, as at the apse of the cathedral of Langres, without a separating partitionbetween that roof and the opening. An analogous arrangement, but with very different architectural forms is found in another province. At the cathedral of Evreux in the first bay of the nave, partly concealed by the organ front, is a remnant of the triforium of the 12 th century, which is simply pierced in the wall receiving the roof of the old side aisle, now occupied by a tower, and is composed of an arcade with tympanums resting on small isolated piers. We give (Fig. 10) the elevation and horizontal plan. This triforium, nearly contemporaneous with that of Sens, is much less extensive from the point of view of construction; for these arches intersect and form a very mediocre relieving arch, and these tympanum-lintels might break very easily, or break off the projections of the capitals at the least movement of the structure. Yet this example again emphasizes the varied resources by which those architects of the 12 th century knew how to profit. This is an entirely Norman arrangement, and that is found again in England in the monuments of this epoch.

The triforium opening directly beneath the roof of the side aisle, presented inconveniences easily appreciated. It admitted cold and dampness into the church, for the roofing was of tiles or slates, and however well made, they always allowed the external air to pass. The view of the carpentry through th these openings was not pleasing. It was difficult to maintain clearness under these roofs, and in high winds dust was scattered in the church. Hence men did not delay to isolate the triforium from the roof, i.e., to build between it and the opening a s one partition, thus forming a closing wall. It had been attempted indeed at S. Leu d'Esserent, as we have seen, but there is a mean between this last system and that of the vaulted triforium.

The nave of the cathedral of Amiens appears to be one of the first religious structures in which the architect sought frankly to separate the triforium from the shed roof by means of a fixed partition. Here (Fig. 11) at A is the plan of half a bay of that triforium. [1] At B is the sketch of the pier at the level of the gallery and at the level of the ground story; at C

the buttress that supports the column receiving the head of the flying buttress,[2] and at D the partition of masonry with a relieving arch. At E is given the elevation of this triforium next the nave. At G is seen the relieving arch of the partition. As at Sens, the opening is divided into two bays, the little pier P supporting the central mullion of the window and resting on the crown of the archivolt of the side aisle.[3] At H is traced at a larger scale the horizontal projection of the little pier B with the abacuses of the capitals, and that of one of the little columns; and at I is the section of the moulding of the arch I'. One will note that this gallery being placed at a great height, and the width of the nave not being able to give much recession, the horizontal mouldings, such as the bases and abacuses, are very developed in height and project little, so as not to be concealed by perspective projections.[4] Often the capitals of the little columns of those triforiums of the middle of the 13 th century have very low and hollowed courses, so as to develop their projections to the eyes of persons standing on the floor. A very remarkable example of this system, adopted because of the perspective effect, is found in the cathedral of Chalons-sur-Marne. At Notre Dame of Amiens it is seen that the architect, preoccupied by the perspective diminution of his arrangement of the gallery, has exaggerated the proportions in height with reference to the width. By such attention to the conception of the different parts of an edifice, the masters are recognized. In drawing the elevation, they evidently take account of the deformations produced by the height and relative distance of place; they obtained the desired effect without being compelled, as one frequently sees today, to experiment and to modify in place entire portions of edifices, to obtain after these costly trials only indecisive proportions or incomplete effects.

Note 1.p.290. Art. Trouee, Fig. 10.

Note 2.p.290. Art. Cathedrale, Fig. 20; see the section.

Note 3.p.290. Art. Trouee, Fig. 10.

Note 4.p.290. Art. Profil, Fig. 26.

The section of the triforium of the nave of the cathedral of Amiens (Fig. 12) made on a b shows the skill of the constructor. In that section, one sees at A and B the two concentric pointed arches that form the archivolt of the gallery. At C is the int-

internal reinforcement at the great piers, and at D is a connecting lintel. The archivolt B starts on the capital of the little internal reinforcement of the little pier P of the plan, a and penetrates the reinforcement C. At E is the ceiling of the triforium forming a passage above the roof F of the side aisle. At G is the isolated column that receives the relieving arch marked G on the sketch (Fig. 11); at I is the partition closing the attic, and at L a relieving arch bearing that partition and allowing the vault of the side aisle to pass under its intrados. The great upper windows open in M directly above the triforium.[2] Yet the walls receiving the roof of the side aisle appear naked, when seen behind the opening of the triforium; men soon decided that they must be perforated, and in the same church (Notre D Dame of Amiens), the architect that erected the high part of t the choir established hip roofs over the side aisle, so as to be able to open windows in the enclosing walls of the triforium. Thus these triforiums soon participated in the upper windows. [3] About the middle of the 13 th century this system was adopted in a great number of churches of the royal domain, notably at the cathedral of Troyes and at the abbey of S. Denis, in great part rebuilt under the reign of Louis IX. The triforium of the nave and choir of the last church is very remarkable in composition. We give (Fig. 13) the plan A and the elevation B of half a bay of this triforium. At C is sketched the rear w window C′ of the plan, which receives the glass; so that one perceives the glass of this opening C through the front arches. Here the triforium is more intimately connected with the great upper windows than at Amiens, by means of the little columns D of the tracery. But the tympanums T of the two arches are still solid, while a little later those tympanums are themselves perforated as at Notre Dame of Paris, beneath the rose windows of the transepts (1260), in the choir of the cathedrals of Beauvais and of Troyes (1250), in the choir of the cathedral of Seez (1 (1270), in the abbey church of S. Ouen of Rouen (1300). Then the triforium is only the continuation of the upper window, and is separated from that only by a slab forming the ceiling of the glazed triforium of the floor of the passage above that. F Fig. 14 explains this arrangement adopted in the abbey church of S. Denis. At A is the floor of the triforium; at B the floor of the passage. At S. Denis the triforium everywhere has the

same width and is not narrowed by the reinforcements at the piers, as at the cathedral of Amiens. The buttress C bears the column D which receives the head of the flying buttress. [1] The side aisle was covered by hip roofs with a gutter E, so as to permit the opening of windows in the partition G. [2]

Note 1.p.292. Art. Cathedrale, Fig. 20; see section of nave.

Note 2.p.292. Arts. Travee, Fig. 10; Fenetre, Fig. 20.

Note 3.p.292. Arts. Travee, Fig. 11; Architecture religieuse, Fig. 36; Fenetre, Fig. 24.

Note 1.p.296. Art. Architecture religieuse, Fig. 36.

Note 2.p.296. See Art. Trait, Fig. 4, to take account of the portion of this triforium at the piers.

Perhaps the most complete and most developed example of the triforium absolutely connected with the upper window is found in the choir of the cathedral at Seez, whose construction dates from about 1270. [3] This monument was conceived in a very wise way, but was badly founded on bad soil, and has much analogy to the choir of the church S. Ouen at Rouen. The defects in construction, that have compromised the durability, belong to insufficient execution and probably a lack of resources. From the point of view of theory, the choir of the cathedral of Seez even would excel in value that of the abbey church of S. Ouen, had it been founded on a good soil, and if the materials had been properly selected, and with a strength proportioned to the loads that they have to bear. [4]

Note 3.p.296. Art. Travee, Fig. 11.

Note 4.p.296. The foundations of the cathedral of Seez are merely masonry belonging to a much older monument, on which t the structure was placed badly, and thus poorly built foundations are not placed on a resistant soil. Evidently there was a necessity for economy.

Fig. 15 gives the triforium of one of the parallel bays of t the choir of the cathedral of Seez. The archivolt A of the side aisle is surmounted by a gable, behind the rake of which extend the little columns, that form the window of the triforium and the high window. The arrangement of that upper part then commences directly above the archivolt (Art. Travee, Fig. 11); and from the level B the sections of the arcade of the triforium a and the tracery of the window. A single slab C forms the sill of the window, covers the passage of the triforium and serves

as an external walk above that passage. As at S. Denis and as in the choir of the cathedral of Amiens, the external glazed window D is no similar to the inner window, which is very well calculated; for if the forms of the open tracery are alike outside and inside, there result in perspective superpositions of lines with a bad effect. On the contrary, these traceries being different, the eye naturally separates them, and the intersections of the curves produce varied and rich combinations. At s Seez, as at S. Ouen of Rouen, there is no longer a solid sill wall, but a perforated balustrade forming the sill of the triforium, so that for persons on the lower floor, the glass of t the outer window D is seen through that balustrade. The intention of opening more and more the bays over the side aisles, and of making them a sort of translucent tapestry without interruption, must evidently date from the second half of the 13 th ce century, and appears about the end of the 14 th century in Ile-de France and the adjacent provinces with rare exceptions. Like the high windows themselves, the triforium then occupies the e entire space between the piers. Three religious monuments of that epoch (end of the 13 th century), very probably due to the same architect, form an exception to this rule; these are the cathedrals of Clermont and Limoges and that of Narbonne, whose choirs were only completed before the 14 th century. In these three churches the high windows do not entirely occupy all the free space between the piers supporting the arches of the vaults; they are narrower, and the opening of the triforium only occupies the width of the windows. These passages of the triforium are not opened externally, but have a solid closing wall, although the side aisles are covered by terraces, that in our opinion was only temporary. Further, those passages extend around the piers instead of passing through, as in the North. [1] It is necessary for this system to have the freedom of the mode of construction adopted in our northern provinces. The arcades of the triforium are detached from the piers and leave a pier at right and left, do not produce a good effect or explain themselves clearly. And in fact no requirement of construction is a motive for this sort of mullions loading the piers without reason.

Note 1.p.298. Art. Architecture religieuse, Fig. 38.

While the triforium developed thus by forming one with the

upper window in the North, the architects proceeded otherwise in Burgundy in the 13 th century. They retained the solid closing wall to receive the shed roof of the side aisle, and instead of reserving above the triforium an external passage, they placed it inside. The upper window of the bay thus found itself raised vertically above this closing wall and no vertically over the internal opening, as in the preceding examples. [2]

Note 2.p.298. Art. construction, Figs. 78, 79 bis, 88.

Here (Fig. 16) is an example of that construction taken in the pretty church of S. Martin of Clamecy. One sees how the triforium assumes importance in those Burgundian monuments. It is an actual portico raised above the archivolts of the side aisles. This system cannot lead to connect the triforium with the upper window, being placed behind it; thus we see it adopted in Burgundy and a part of Nivernais only when in those provinces the local traditions are abandoned about the end of the 14 th century, to resort to the architectural style of the royal domain. The arrangement of the Burgundian triforium-portico must necessarily lead the architects to decorate in a particular manner those arcades, that assume to much importance in the naves. The little columns no longer rest here on a sill wall as at Amiens, or on a balustrade, but directly on the floor of the triforium, marked by a projecting band; a disposition that also contributed to give grandeur to this arrangement. At Semur-en-Auxois, the arcades of the triforium of the church of Notre Dame are decorated by projecting heads very skilfully sculptured. In the nave of the cathedral of Nevers, little cariatids support the little columns, and figures of angles fill the spandrels (Fig. 17). These porticos are built of large materials, and in their height the piers are often composed of g grouped columns. [1] Generally in Burgundian churches the upper windows do not have the relative importance (because of the size of the triforium), that they assume i. the religious monuments of the royal domain. Fig. 16 is the proof of this. Sometimes even the triforium is confused with the upper window. T The abbey church of S. Seine furnishes us with an example of t that singular arrangement, dating from the beginning of the 13 th century (Fig. 18). Here is the side arch of the high vault, that circumscribes the arcade of the triforium, that is no longer more than a decoration. This last system has frequently

been adopted in the Norman churches of the 12 th and 13 th centuries in France as in England. But the triforium in the Norman churches merits particular study. During the first period, i.e., in the 11 th century, it consists of a story raised above the side aisle and covered by visible carpentry, and an upper passage at the level of the high windows. One cannot doubt today (since the work undertaken by M. Ruprich Robert in the two abbey churches of Caen, the abbey-aux-Dames and the abbey-aux-Hommes), that the naves of these churches were originally covered by visible carpentry. [1] Now there always exists in religious monuments of great dimensions in Normandy, a circulation passage above the triforium and beneath the upper carpentry. Here is a section of the primitive nave of the abbey-aux-Hommes (Fig. 19), [1] which clearly explains what we have just stated. At A is the triforium with its carpentry; at B is the walk at the level of the upper windows and under the great carpentry C. It is easy to take into account the use of this passage. The visible carpentry was composed of timbers forming projections with spaces between; they were decorated by paintings. This s sort of work required frequent care, were this only a dusting, for spiders would not delay to spin their webs in the spaces left between the rafters or joists. These timbers required to be visited to prevent the dry rot caused by leaks. The walk B then facilitated this constant inspection. Further, it allowed the visiting and repairing of the glass of the upper windows, and gave passage to the roofers to repair the roofing. At E is traced a bay, or rather an internal half bay, for in the nave of S. Etienne of Caen the bays are double according to the Norman method (hexapartite). [1] The dotted line a b c d indicates the longitudinal section of the passage B. In the 12 th century in nearly all Norman-French naves, visible carpentry was replaced by vaults. Then to abut these vaults, in the triforium A was constructed the continuous half tunnel vault D, with transverse arches f at the old pilasters f'. This half tunnel vault did not require the destruction of the passage B, no more than the upper vault; on the contra y, this passage was opened more widely next the nave and was decorated by little columns. (Fig. 20). The windows a as well as the passages were retained while raising their sills by a course, so as to find the new slope of the roof. The floor of the passage at the level b in

the Romanesque arrangement was lowered to d, to give more slender proportions to the upper gallery. The architect probably dared not open new arcades at g, as he had done at the middle pier of the bay, fearing to weaken the principal piers, and 1 also because the perspective of the diagonal arches partly concealed it. Thus the reason of utility that had produced the passages beneath the upper carpentry of the primitive Norman churches, when those churches were vaulted became a motive of the decoration, that persisted in the monuments of that province until the end of the 13 th century.

Note 1.p.300. As in the church of Semur-en-Auxois, in the c church Notre Dome of Dijon (Art. Construction, Fig. 80), in the cathedral church of Auxerre (Art. construction, Fig. 88).

Note 1.p.301. See the Notice by M. Ruprich Robert, Eglise de la S. Trinite et Eglise de S. Etienne at Caen. 1864.

Note 1.p.302. After M. Robert.

Note 1.p.303. Art. Trouee, Fig. 2.

The chevet of the cathedral of Lincoln (England) furnishes us with one of the most remarkable examples of the persistence of that tradition (Fig. 21). The triforium there is still covered by visible carpentry like that of the Norman Romanesque churches, and the upper passage is combened with the window opened under the side arches. This passage no longer has any real utility, since if it did not exist, the glass could be r repaired from the outside by passing along the slab forming t the roof of the triforium. The internal open arcade of the passage is connected with the glazed window by means of lintels forming the course of the abacuses of the capitals. In this method is a desire to produce an effect by the play of these two traceries, the internal one of them being only a decoration. One will note in this example how the arches of the triforium are charged with mouldings and ornaments, and how this richness contrasts with the naked appearance of the visible carpentry. It is evident in this Norman architecture of the 13 th century, that the Romanesque tradition retains its empire and often becomes the occasion of forms and methods no longer justified because of the changes introduced in this mode of construction. An arrangement was adopted in the choir of the cathedral of Ely, almost exactly reproducing again that of the upper passages of Norman Romanesque churches. On the contrary in our French arch-

architecture, the lay school of the 12 th century lays aside all Romanesque traditions, and is only inspired by the necessities imposed by the new method of construction: it always proceeds in a logical and clear manner, only using the necessary materials, and can always give a reason for what it does. It would be desired that one could say as much for our modern schools of architecture.

But we must limit ourselves, as the documents abound, and we can indicate here only the principal ones, those presenting a quite particular character. We hope that these examples suffice to emphasize the variety, that our masters of the middle ages knew how to bring into their conceptions, without ever abandoning an accepted principle.

We shall only speak incidentally of the triforium, whose form is unusual. The little church of Champeaux possesses a triforium opening directly beneath the roof of the side aisle by rose w windows now closed, but very probably originally filled by tracery in the style of that replacing the rose windows pierced a above the triforium of the cathedral of Paris. In some churches the triforium consists only of a single or double opening likewise beneath the roof. The cathedral of Beziers, in the parts of the nave rebuilt in the 14 th century, shows us a triforium so composed (Fig. 22). This opening beneath the roof of the side aisle consists of two square openings in the lines of the tracery of the upper window. Sometimes, but very rarely, in good French architecture, the triforium is simulated and then is merely a blind arcade, a mere decoration occupying the height of the roof of the side aisle. The arrangements adopted at S. Denis, in the cathedrals of Troyes, Beauvais and Seez, in the abbey church of S. Ouen of Rouen, persist during the 14 th and 15 th centuries. The details of the triforium become more slender, the mouldings are leaner, but no new method appears. The arcades are modified according to the taste of the moment, but they continue to be connected with the upper window. Yet at the end of the 15 th century, it sometimes occurs that the triforium assumes a special arrangement, charged with details, cusps, ogee curves and sculptures, leaving a solid interval between it and the window. In the 16 th century, men are contented to substitute, for example as at S. Eustache of Paris, forms approaching Roman architecture for the Gothic forms. These tenden-

tendencies are more or less happy, bu do not constitute an invention or improvement; thesese are questions of detail on which it seems usele s to enlarge.

TRILOBE. Trefoil.

Ornament, opening, open rosette, with three lobes. 7rt. Trefle).

TRINITE. Trinity.

The middle ages attempted to represent materially the mystery of the Holy Trinity. It is necessary to have recourse to the s school of Alexandria, if one wishes to know the different steps by which men must have passed from the idea of the Trinity before arriving at the condition of a dogma. it is well understood, that we do not have to occupy ourselves with the exposition of a dogma, but to render an account of the visible form given to the conception of the Trinity in our monuments of the middle ages. "From the 4 th century," writes M. Didron, [1] " with S. Pa Paulin, bishop of Nola, who was born in 353 and died in 431, appeared the groups of the Trinity. In the apse of the basilica of S. Felix built at Nola by Paulin himself, is seen the Trinity executed in mosaic."

Note 1.p.307. Iconog. chret. by m. Didron. paris. 1843.

S. Paulin explains in the verses that he made on that occasion, that Christ was represented in the form of a lamb, the Holy Spirit in that of a dove, and that"the voice of the father reechoed in the sky." The same bishop in the basilica erected at Fondi under the name of S. Felix, caused the Son to the represented in the form of a lamb with the cross, the Holy Spirit as a dove, and the Father in the form of a hand (probably) that crossed the Son. (Latin verse).

As M. Didron very well observes; [2] "anthropomorphism, that had frightened the first Christians and served to recall paganism, did not find the same opposition in the middle ages proper. Once arrived at the 9 th centurynothing was to be feared from pagan ideas. The Eternal Father, whose hand they had only dared to show, or at most the bust, is shown on foot. Still he does not assume a special figure; but he borrows that of his Son, and hence it becomes very difficult to distinguish one from the o other. The Son continued to appear as he had been seen on earth. The dove also sometimes left its covering of a bird, to take t

the human form. As the dogma distinctly declared that the three person.ges were no only similar but equal to each other, the artists extended to the representations similarity and sometimes equality if the divine hypostases. "Indeed, a good number of p painters of manuscripts of the 11 th and 12 th centuries [1] represent the three divine persons in the form of three men of the same age and appearance. On the portal of the collegiate church of Ma tes, in the arch of the western portal, the Trinity is represented by a cross supporting two angels (the Son), by the Father in the form of a young man, and the Holy Spirit as a dove. But artists pretend to identify the three divine persons, so as to make understood by believers both their individuality and their union in a single power. There exists beneath the w western unfinished porch of S. Urbain of Troyes a relief in w wood dating from the last years of the 13 th century, that represents the Trinity (Fig. 1). The Father is in the middle, cr crowned with the triple tiara like a pope; he blesses with the right hand, and holds the earth with the left. On his right is the Sonocrowned with thorns and bearing the cross; at the left is the Holy Spirit in the form of a beardless young man, holding a dove. These three personages together have only four legs, so adroitly draped as to cause the belief that each has two. Little kneeling figures of a man and a woman (the givers) are sculptured at the two ends of the group. The impossibility of separating the three divine persons is thus materially indicated by the arrangement. Sometimes the Trinity is indicated in the form of a man having a head with three faces, one in front and two in profile with only two eyes; or indeed it is a geometrical figure arranged thus (Fig. 2). This mystic triangle was stoll visible on the facade of a house of Bordeaux a few years since. Stained glass and vignettes of manuscripts represent it very frequently during the 15 th and 16 th centuries. At the same epoch in many portals, the Trinity appears thus:- the Father is seated and crowned with the tiara, holding Christ on the cross before him. From the mouth of the Father the dove descends on the crucifix. These different representations have an interest; they indicate the advance of art as a visible expreusion of theological ideas according to the times. During the first centuries men evidently feared a too material expression of a mystery, that should remain impenetrable. The Son is a lamb,

the Spirit as a dove, and the Father as a voice or a hand projecting from a cloud. Later the artist is reassured, and he gives individuality to the three divine persons. They are separate and distinct, but similar and seated on a common throne. Then it is sought to make understood by a material artifice the unity of the three persons. In the 15 th century it is a sort of geometrical problem placed before the multitude, whose solution is left ar an enigma; or again it is the sport of the artist, like the head with three faces. In the 16 th century was adopted a little known earlier form, that of the absolute distinction of the three persons, because of the parts attributed to them by Christian ideas. The Father is the unchangeable personage; the Son is the redeemer; and the Spirit is the emissary emanating from the Father; love, according to S. Augustine and S. Thomas of Aquinas. "Jesus, having been baptized, left the w water at once, and then the heavens were opened to him, and he saw the Spirit of God descending in the form of a dove and coming to him; then a voice from heaven said; this is my beloved Son, with whom I am pleased.[1] It is then very important to m make these distinctions in the characters given to the Trinity represented on the old monuments.

Note 2.p.307. Iconog. chret. by M. Didron, Paris. 1843.

Note 1.p.308. Among others, the beautiful manuscript of Herrode of Landsberg, Hortus deliciorum. Library of Strasburg.

Note 1.p.310. Matthew. III. 16, 17.

The middle ages also admitted a trinity of evil. Likewise t the theologians had claimed to find the reflection of the Holy Trinity in the human soul:-- will, love and intelligence, combined in one substance, they supposed evil to have corresponding faculties. Sculptures, paintings on glass and manuscripts indeed represented the satanic trinity (Fig. 3).[2] This miniature of the 13 th century shows the sinner subject to the laws of the trinity of evil, armed with the sword and crowned. Satan is often represented thus in the reliefs of the last judgment. Besides his three faces that correspond in the evil to the three hypostases of God, his body is sometimes covered by other human faces, as if the power of evil is more extended by its faculties than that of good.

Note 2.p.310. Old manuscript, property of S. Germain. Psalm 37. Library Imperiale.

TROMPE. Trumpet.

Masonry of voussoirs in the form of a shell, that serves to support a corbelling, either a straight surface projecting at a cut-off angle, or a straight surface at a reentrant angle. T The constructors of the middle ages made great use of trumpets to support octagonal stone spires on square towers, watch turrets on walls and corbelled turrets. They employed trumpets instead of pendentives to establish domes on transverse arches resting on four piers.

Trumpets are jointed, either by means of a series of concentric arches, or in form of a cone. Fig. 1 gives a trumpet composed of concentric arches splayed at 45°, so as to join the sides of the square. At A is traced the horizontal projection of one of those trumpets, at B its elevation and at C its section. This sort of trumpet is the oldest, and is found in the monuments of the 11 th century; they are easily built, each arch h being independent. They are often seen at the base of spires of the 11 th and 12 th centuries to pass from the square to the o octagon. In the 12 th century already appear conical trumpets, as shown in Fig. 2. To avoid the junction of very thin voussoirs forming the trumpet at the vertex of the cone, the stonecutters often placed a semicircular stone instead of that vertex at a; thus they formed a little centering on which rest the intrados of those voussiors. Such are the trumpets that are still seen on the turrets of the abbey of Chailly (end of 12 th century; Fig. 3). Then this first stone placed at the vertex of the reentrant angle at b, and hollowed out in conical form, is called a little trumpet (trompillon).

If it be required, as in the two preceding examples, to obtain a plane at 45 degrees intersecting a right reentrant angle at 45°, the construction of trumpets presents no difficulties. In this case the voussoirs have their extrados traced on a cylinder parallel to their axis, and their intrados on a cone; but if one desires to establish a projecting corner above the reentrant angle, difficulties present themselves. Thus (Fig. 4) taking a reentrant angle A B C on which it is required to place a construction forming the projecting angle A D C, the stonecutter begins by setting a series of corbels on the diagonal B D of the square, (see vertical projection P), and then he will fill the two spaces A D, C D, by means of two skew c

conical trumpets. The second voussoir a will form an abutment to support the projecting angle b. The overturning of the corbels is prevented by the load resting on their tails from d to e and that rises to above the extradoses of the arches.

At the end of the 15 th century, men took pleasure in raising difficulties in stonecutting in order to give a proof of knowledge. The constructors then sought to omit these corbels and to support the salient angles on a reentrant angle or on a cut-off angle by a system of jointing the voussoirs. But then it was necessary for these voussoirs to be cut with side projections, that is a bad method in principle, the stone being no longer loaded parallel to its bed. Thuse are artifices of stereotomy having nothing in common with the serious art of the constructor, and which are made to amuse minds interested in useless problems.

TROMPILLON. Littèe Trumpet. See Art. Trompe.

TRONE. Throne. See Art. Chaire.

TROU DE BOULIN. Putlog Hole. Art. Echafaud.

TRUMEAU. Pier. Mullion.

This word is generally applied to the entire part of the wall of a stroy comprised between two openings. Just as a pattlement is composed of crenelles, that are the openings, and of merlons, that are the solids, the wall of a habitation comprises piers and windows in each story. The name of mullion is particularly given in the architecture of the middle ages to the piers that divide into two openings the principal portals of great halls, of naves of churches, of crofts, meadows, etc. For the great monumental doorways, the architects of the middle ages only thought of wooden leaves shutting against each other in rebates, presenting a sufficiently solid enclosure. Between these leaves they built a stone pier forming a fixed rebate, a pier in the wide rebate of which engaged horizontal bolts, beams or bars of wood. [1] This method became one of the beautiful motives of the decoration of principal doorways; it also allowed the support of stone lintels below the tympanums, that with rare exceptions were of a single piece.

Note 1.p.215. To these mullions of doorways was also given t the name of estoufiches.

We do not find in Greek or Roman antiquity any example of d doorways divided by a mullion; it seems that this arrangement exclusively belongs to the middle ages, and only dates from t the end of the 11 th century. It permitted the eary establishment of two currents for the multitude at a single opening, wi without confusion arising from one entering and the other leaving. The portable canopies of wood covered by fabrics, termed "dais", and that particularly in France the clergy caused to be borne over the officiating priest or the bishop in certain circumstances, a canopy that attained the dimensions of a small room, not being able to pass through one of the two openings of the principal portals of churches, the middle mullion was sometimes removed in the last (18 th) cen ury; art objects of great vaule were thus destroyed. Happily, these mutilations required very considerable expense to support the lintels and tympanums; hence there still exist a good number of doorways equipped with their mullions. One of the oldest and most remarkable is the great doorway of the nave of the abbey of Vezelay. The mullion of this doorway is frankly accented and presents a profile of very beautiful character. [2] The openings are wide; the two lintels of the tympanum above them rest solidly on the two corbels of that central pier (Fig. 1). The statue of S. John Baptist, clothed in a robe of a skin, bearing the lamb in a halo, occupies the axis o the pier; he precedes, so to speak, the assemblage covering the tympanum. At his right and left are figures of phophets, and his feet rest on a beautiful capital. the evident intention of the architect was to leave the widest possible space for the multitude, and to relieve the spans of the lintels by means of those strong lateral projections decorated by figures. When the doors are opened, the effect of this mullion detached against the middle of the nave is imposing. Nothing in antiquity recalls this form and outline of a singular effect. The artist that composed this doorway, and who knew how to profile this mullion, knew his profession. There is no hesitation, the decoration is in perfect harmony with the construction, and in examining this work, the idea does not occur that it could be conceived otherwise. It is rare that the mullions

of doorways have this masterly amplitude. During the 12 th century, they consist only of a pier, that the architect derigns as slender as possible not to obstruct passage, and that is na habitual y decorated jy the statue of the divine personage, or of the saint, under whose name is placed the church. On these principles is composed the mullion of the central western portal of the cathedral of Sens (Fig. 2); this doorway dates from 1170 and was restored at the end of the 13 th century. The statue of S. Etienne, patron of the church, decorates the mullion, on the surfaces of which rise ornaments of the best style.[1] The reliefs that decorate the lower part of the pier were mutilated at the end of the last (18 th) century. One sees at the doorway of S. Anne of the cathedral of Paris (right side of t the facade) an earlier mullion, on the front of which is sculptured the statue of S. Marcel. Under the feet of that saint is represented th tomb of the damned woman, that served as a habitation for the dragon slain by the holy bishop, whose head is protected by a canopy. The separating piers of the doorways w were treated in a far more simple way, when the edifice did not admit of luxurious ornamentation. We give here (Fig. 3) the mullion of the principal doorway of the church of Souvigny, a church of the end of the 12 th century, built with extreme simplicity. This mullion is a rectangular monolithic column decorated by a little column sung in the panel, and surmounted by two c corbels, intended to relieve the lintels.

Note 2.p.315. Art. Porte, Fig. 51.

Note 1.p.317. Art. Sculpture, Fig. 52.

It is certainly by the richness of details that is recommended this piece of stone; still the purity of the mouldings and the elegance of the drawing make one of those works, that please the eyes. The beautiful epochs of the art above the secret of charming by their simplest productions, as well as by their splendid conceptions. When an art has no other resources for pleasing than profusion of sculpture and richness of material, it is judged; it is an art of decadence; if it surprises for a moment, satiety soon succeeds that first impression. Let us again take an example of those simple compositions, that charm only by a happy proportion, a refined study of drawing. Here (Fig. 4) is the mullion of the doorway of the church of the Nativity at Villeneuve-le-Comte.[1] A statue surmounted by a canopy alone

decorates this monolithic column. The arches forming the lintel springs from the pier and enclose figure reliefs, representing the Holy Virgin and the three magi kings. The statue of the bi bishop rests on a base of rectangular section, whose proportions ahe studied with much care. One recognizes in the conception of this doorway the hand of one of those masters of Ile-de-France, that knew how to give their simplest compositions the stamp of distinction peculiar to that school.

The churches of Burgundy built during the fisst half of the 13 th century furnish remarkable examples of doorways with mullions. The quality of the materials of that province permits giving a small section to these monolithic piers, and consequently an appearance of lightness not found elsewhere. Unfortunately the iconoclasts of 1793 made a bitter war on all statuary in Burgundy; very few mullions have retained their statues. Y Yet the composition remains, and that occupies us here in particular. Here (Fig. 5) is the mullion of the central doorway of the church of Semur. This mullion, whose horizontal section is sketched at A, is narrow bu deep, so as to support two relieving arches above the two openings. The external part is decorated by a little column with capital and circular abacus , supporting a statue of the Holy Virgin; [1] on the sides of this pier are sculptured the arms of Burgundy and the fleur-de-lis of France, mingled with some delicately treated personages. Two corbels with little figure relieve the lintels, that descend behind the status, an arrangement imparting grandeur to the c composition. This statue was surmounted by a canopy, that was restored about the end of the 13 th century, as shown by our Fig. At the church of Notre Dame of Dijon, which dates from the same epoch, and that has many points of resemblance to that of Semur, the mullion of the central doorway is very slended and consists of a little external column bearing the statues, and a second higher little column inside forming the jamb. (See the section, Fig. 6 at A, made at the level of the attachment of the statue). On the shaft of the internal little column is sculptured a head servinm as catch for the bolts of the tio leaves. This detail in remarkable work indicates the care that artists took in even the accessory parts, as they knew how to foresee the least needs of the construction, and made it a motive of decoration. The stone employed here being of extreme hardness,

the architect reduced the section of the mullion as much as possible. The quality of the materials employed thus evidently influenced the form of these piers dividing the openings of the doorways. Sometimes a holy water stoup hung from the ring insidel if this were sufficiently deep to permit the swinging of the two leaves.

Note 1.p.321. From 1230 to 1240.

During the 14 th century, the form given to the mullions of portals was little modified: the principle accepted after the 13 th century persists, i.e., the pier is composed of a lower part more or less rich on which is engaged a statue surmounted by a canopy (Art. Porte). One sees beautiful dividing mullions in the doorways of the cathedrals of Paris, Amiens, Chartres, Bourges and Rouen. After the end of the 14 th century, the mullions do not always stop below the lintels: they intersect the tympanum, present a projecting decoration thereon, that assumes much importance. For example, such are the mullions of the doorways of the facade of the cathedral of Tours, that date f from the beginning of the 16 th century, those of S. Eustace of Paris, S. Wulfrand of Abbeville, etc. The Articles Porte a and Tympan render an account of these arrangements, which belong to the end of the 15 th century.

TUILE. Tile.

Plates of terra cotta employed for covering buildings. It would be difficult to discover the origin of the tile; the Aryans used this means of roofing before Grecian civilization, t the Dorians made use of tiles and made them perfectly; the Romans scarcely covered their edifices excep by tiles or metal, a and wherever they passed, one finds a quantity of fragments of the tiles called Roman, whose form is known to all.

The Roman roofing was composed of rows of flat tiles set beside each other, with raised edges and lapping, on the joints of which were placed hollow lapped tiles. The flat Roman, like the Grecian tile, was rectangular in form; its dimensions varied from 15.8 to 13.4 ins. long b: 10.6 to 9.1 ins. wide. The longer parallel sides with upturned edges were held by notches made below the edges, at their lower ends. This system required quite difficult work and much care in setting in the kiln. The first centuries of the middle ages continued this procedure of

fabrication well or badly; but it is easy to distinguish tiles made from the 6 th to the 10 th centuries, from Roman tiles. T Those tiles of the first times of the middle ages are coarse and warped, fit badly and are of smaller dimensions than the R Roman tiles. About the 11 th century were renounced the notches for roofing. In the provinces of the South of France tha preserved the antique traditions, a trapezoidal form was given to the flat tiles, so that they could cover without notches, and by the introduction of the small end into the larger one. Fig. 1 explains this system of tile roofing, that we find adopted f from the end of the 11 th century in our provinces of Languedoc and Provence. Relatively to their length, this sort of tiles a are wider than the Roman tiles so as to leave a sufficiently open space between the tiles covering the joints, that themselves had to be sufficiently open to cover the space occupied by the edges of the flat tiles. The flat tiles were first laid directly on the rafters as indicated in our Fig., without sheathing. The difficulty in this sort of coverings was to connect at the hips. The hip tiles are easily set on a roof with plane sides, but cannot be fixed on the junctions of surfaces composed of flat tiles with covers. By the aid of mortar, one succeeded in fastening well or badly the hip tiles; but it is unnecessary to state that this means is contrary to the conditions of good construction. The carpentry receiving the tiles is subject to movements produced by changes in temperature; in t that case these patches of mortar break, the hip tiles become loose and are overturned by wind. This inconvenience was avoided during the 11 th and 12 th centuries, when the edifices were vaulted, by placing very strong hips of stone with projections covering the orrfing. The remains of the use of this system are seen in some edifices of Provence and Languedoc, notably on the church of S. Madeleine of Beziers.

Fig. 2 explains the arrangement of those stone hips, [1] terminated at their lower ends by an antefixa A belonging to the first piece, giving weight and bearing to the angle of the cornice. As B is traced the section of the hip, and at C its plan, with the positions of the flat tiles and covering projection. The skew tiles were moulded expressly for the place or were simply cut. The space a b being sufficient to receive the flat and cover tiles. On the top of the a sinking e cast the rainwater

on the covering and prevented it from washing the joints, simply filled with cement. [2] If this system of roofing was entirely laid on carpentry without vaults underneath, it was not possible to employ the stone hips given in Fig. 2; those hips must be of terra cottal like the flat tiles. Then for structures b built with care were made special hip tiles according to the i inclination of the rsof. Those ridge tiles were furnished with outlets that received the cover tiles of the slopes (see Fig. 3). [1] Thus one was not compelled to fix thhese tiles with mortar. One should not omit the gutter tiles placed at the base of the roofs as gutters to receive rainwater, and conduct it to the leaders of terra cotta or to projecting gargoyles. It is unnecessary to state that these gutter tiles were employed only in the most ordinary structures built of brick or rubble. This was one means of collecting rainwater and of storing it in cisterns. The gutter tiles still found in the South and West of France are very large; they measure 25.6 ins. long and at one side have a flange A prolonged, that serves to anchor them at the top of the wall beneath the eave of the roof (Fig. 4). It is well understood that these tiles were laid or an inclined plane and thus are farther from the eave of the hoof at lower end of the gutter than at its highest point. Therefore this means is only suitable for facades of small extent.

Note 1.p.323. From church S. Modeleine of Beziers.

Note 2.p.323. This system of covering has been employed in o complete manner en the restorotion of the roofs of S. Sernin of Toulouse.

Note 1.p.324. From the 12 th century were employed these hip tiles in the southern and western provinces.

About the end of the 12 th century, terra cotta for roofing, tile floors, arches and crestings, attained a very great development. The mode of fabrication was still pereftced during the 13 th century. The tile work of that epoch is remarkably good and beautiful. The clays were carefully purified and beaten, are well burned and often in very large pieces.

In the provinces of the North of France after the end of the 11 th century was abandoned the Roman system of tile roofs. Indeed that system is little suited for foggy climates. The dust soon stops the channels, aided by the dampness, develops mosses and vegetation that cover the roofs. By the storms of winter

snow is forced under the cover tiles and rots the carpentry; i its weight much increases that of the coverings, already very heavy, and strains the rafters. If the slope is very small, in rainy weather and driven by the wind, water enters between the tiles, that are only covered by a third thickness. If the slope be sufficiently pronounced to ensure discharge of the water, t the tiles are loosened by the wind and slip on each other, and it is continually necessary to replace them. Thus a different system is sought for covering with terra cotta, and men commenced by making great flat tiles 13.0 ins. long by 10.6 ins. wide and 0.37 in. thick. These first flat tiles (we say the first, because these are the earliest that we have been able to find, and whose manufacture dates at the end of the 11 th century) a appear to have been much in use in Burgundy and in a part of Nivernais during the 12 th century. They are quite flat, with the top edge bent downward forming a continuous hook. This hook (Fig. 5) rests on large strips of wood almost forming a sheathing (see A). At Cluny, macon and Vezelay, are still found this sort of tiles long out of use and used as broken tiles or thrown among the rubbish that fills the spandrels of vaults of old edifices.

Note 1.p.326. Art. Charpente.

But the province in which tiles seem to have been studied with most care is Champagne. There are the ordinary tiles and those tiles called tiles of count Henry. The first is 13.8 by 8.4 ins. These tiles (the oldest dating in the 13 th century) are pierced by a hole and have a hook underneath. We shall explain why. The rafters are set with spaces equal to them. When to be covered by tiles, these rafters are 4.3 ins. thick (weak), leaving between them a space of 4.3 ins. But they are not of equal depth (Fig. 5 bis): the main trussed rafters are 5.5 ins. (5 to 6 ins)' the intermediate rafters are only 3.2 ins.' see A.

The distance on centres a b c was then 8.7 ins (weak). On those rafters were nailed oak strips spaced 4.5 ins. apart. Now the tile (see B) as we have stated, has a hook e beneath and a hole t, each at one third the width of the tile. Then when the workman desired to cover with them, he fastened the tile on the lath so that the hole should come on the rafter, and then drove a nail or even a wooden pin through the hole and entering the rafter. The holes being sometimes at the right, sometimes at t

the left, the rows of superposed tiles always had the holes and the hooks on the same line, i.e., the hooks on the laths and the holes on the rafters. (See at C a portion of the roofing w with the tiles shown as placed in order, and at C′ the geometrical drawing of the roofing before setting the tiles). These tiles that are still frequently found on the edifices of Champagne, and particularly at Troyes, are very well made, the hooks well fixed with side flanges (see B). They are slightly convex on top and lie close to the slope and allow no hold for the w wind. The hooks project 0.6 in. These are always found between the rafters and hug the laths closely; the tile would already be held of itself without the roofer having to touch it. He co could then drive the nail or pin into the hole, entering the solid wood of the rafter. We have stated that the spacing on centres of rafters was 8.7 ins (small). Now the tiles being 8.4 ins, leaving 0.3 in. play between the tiles, one sees that the width of these tiles corresponded exactly to the spacing of t the rafters on centres. It is understood that a roofing so made must be durable, the tiles being of excellent quality. The sight of these tiles is only 4.; ins. Now these tiles being 13.8 ins. long, there are always on the roof three thicknesses of terra cotta plates. The thickness of these Champagne tiles is 0.37 in. Tiles of trapezoidal form were made for the part of t the roofing along hips, and likewise today the tile makers of Champagne are still held to furnish these skew tiles without extra cost.

Let us see what were the dimensions and form of the so-called count Henry tiles (Fig. 6). This tile is smaller than the former and is generally glazed on the sight, i.e., from a to b. It Its lower edge b is beveled to give a more uniform covering and leave no hold for the wind. Its hook is well cut with a knife with a small notch above, so that the roofer can feel with the hand without turning over the tiles of the row that he is setting. These last tiles are laid on smaller rafters than those of ordinary tiles, and sometimes on strong strips set almost close together, leaving only space for the hook. Then the nails are driven into these strips without paying any attention to the rafters. [1]

Note 1.p.329. With these glazed tiles was covered the cathedral of Troyes, so as to form a mosaic of red, black and yellowish white.

The tiles of count Henry are made with still more perfection than the ordinary tiles of Champagne. One will note that the hole is larger and square underneath. That was done to prevent the nail from splitting the tile, if it were rocked by the wind, or when the tile was nailed on sheathing. This enlargement then left a certain freedom to the tile (Fig. 6, 7).

The ridge tiles of these coverings of flat tiles are likewise made in great perfection; they were held on the furring of the hip of the carpentry by nails or pins, and ofen made solid by a hook fixed outside on the top of the hip (Fig. 7). Valley t tiles were made as well as those for hips, except that they d did not bear hooks, and that naturally their concave surfaces were on the exterior. As for crestings, we have devoted a special Article to them. (Art. Faitiere).

One sees in Champagne and in Burgundy (especially a tile country) tiles with hooks, whose visible corners are cut off and beveled like those of wooden tiles. These sorts of narrow tiles are glazed on the sight, and are chiefly made for covering conical roofs (Fig. 8). In fact wide tiles cannot fit this sort of roofs, and their angles being tangent to the curve give much hold for the wind and produce a bad effect. To cover conical roofs with tiles, it is necessary to change the widths of the tiles every four or five courses, according to the diameter of the base of the cone and its height, so as to always break joints. For that purpose the tile makers of the middle ages made tiles of different widths and gave them the form of a trapezoid more or less tapered (Fig. 8). The roofer must give the tile maker the forms of the tiles, when the roof was drawn, which was easily done. It was also for the roofer to profit by the different widths of tiles, to harmonize the joints and arrange that in each row, they should fall at the middle of the tiles of the lower row.

In some provinces of the Centre, on the banks of the Loire, in Nivernais and Poitou, men also about the end of the 12 th century made flat tiles in the form of scales.[1] These tiles were narrower than the tiles of Champagne and Burgundy, are sometimes glazed on the sight, and have three grooves that aid the running off of the water (Fig. 9). They are pierced by two holes and have a hook beneath, that rests on the head of the lower tile, and was placed on a sheathing. These sorts of tiles

are thick (the clay of those provinces not being very hard), and have not resisted atmospheric agents as completely as the tiles of Champagne and of Burgundy. All tiles whose forms and dimensions have bust been given were moulded by hand on sand a and cut with a knife, not made in moulds, like most fabricated modern tiles; their burning (with wood) is regular and complete. Old tiles in Burgundy are unchangeable and are as good today as at the time of laying them. The glazing that covers them (especially the dark brown glaze) and the transparent coating that accents their red tint have resisted time. Yellow and green glazes have been most changed. In the provinces of the northeast, in Flanders, were employed after the 15 th century tiles in the form of an S, still in use today and known under the name of Flemish (Spanish in U. S.). These tiles are only good for light roofing, that does not have to absolutely protect the parts underneath. In great winds, they allow rainwater to enter and are easily disturbed. From an early epoch, perhaps t the 13 th century, men ceased to employ in the ordinary works of the southern provinces the flat tiles with joint covers given in Fig. 1. They contented themselves with using hollow tiles, i.e., tiles forming covers and by inverting them, replacing the flat tiles. This kind of covering is still used in the entire South of France beyond Lyonnais, in Auvergne, a part of L Limousin, Perigord, and ascending into Vendee; it is not without inconveniences. The hollow tiles being moulded on sand, the sanded part is found in the hollow. This sandy surface receives all the rainwater and is more porous than the convex surface; it retains wet, catches dust, and develops vegetation that fills the hollows and requires frequent cleaning. This mode is only good in countries where the heat of the sun is strong enough to prevent this vegetation from forming. In adopting the system of flat tiles for roofs with steep slopes, constructors in the North evidently recognized the inconveniences of the antique system and its derivatives, viz:- the persistence of dampness in the carpentry and the growth of mosses in the hollows of the roofs. The care with they fabricated these flat tiles, the use of glazing to preven the penetration of moisture and the growth of the mosses, the system of fastening, indicate that the masters like true architects did not disdain these important details of construction. The flat tiles given in Figs. 5 bis and 6 emphasize

the intelligent foresight of those constructors of the 13 th a and 14 th centuries. It is to be noted that this industry of t tne tile makers only decreased after the end of the 15 th century until the beginning of the present (19 th) one. The tiles of Burgundy and of Champagne made during the last (18 th) century are relatively coarse and unequally burned, and it is only within a dozen years that men have occupied themselves in France with that very interesting part of the art of building. We have been driven into that new path of the use of terra cotta for roofs by our neighbors, the English and the Germans, that have preceded us, or rather that have not ceased to practise those useful industries, generally disdained among us by artists, too much preoccupied by their grand conceptions, and scarcely practical enough to enter into these minor details of construction.

TUYAU. Art. Conduite.

TYMPAN. Tympanum.

The solid portion comprised between the arch of the doorway (archivolt) and the lintel. The name of tympanum is given to the solid surfaces between the extrados of an arch and the b band over it. The surface A (Fig. 1) is the tympanum of a doorway; the surface B is the tympanum (spandrel) between two arches. The tympanums of doorways being placed on a lintel can be made in various ways; composed of small materials as a filling, or of large surfaced blocks of stone decorated by paintings or reliefs. It also occurs that the tympanums of doorways are opened and have transmo windows, but this arrangement was scarcely adopted till after the middle of the 13 th century, notably in the monuments of Champagne. The place occupied by the tympanum under the archivolts of the doors was particularly favorable to sculpture. In that position the reliefs could not fail to produce a great effect, and (protected as they were by the projection of the arches or porches) did not have to fear the destructive action of rain and frost. Many of our churches still retain magnificent sculptured tympanums (Art. Porte). Among the most remarkable dating from the 12 th century, we shall cite those of the doorways of Vezelay, of S. Benoit-sur-Loire, of Charlieu, the western portal of the cathedral of Chartres,

portal of S. Anne of Notre Dame of Paris, central portal of the cathedral of Senlis; among those of the 13 th century, the tympanums of the lateral doorways of the cathedrals of Chartres a and of Rheims, the portals of the cathedrals of Paris, Amiens, Bourges, etc. Until about the beginning of the 13 th century, the tympanum of a doorway, if sculptured, rarely comprised more than one subject; sometimes if very great, it consists of two zones, as one can see on the central portal of the Virgin of Notre Dame of paris, rarely of a larger number. Dating from a about 1240, the tympanums generally consist of several zones. Subjects are superposed and multiplied, or rather are enclosed in architectural compartments. Statuary thus loses its magisterial importance, and it is subjected to a smaller scale. For the very broad system that consisted in placing a lintel with its sculpture of a great relief above it, was substituted a series of superposed lintels (Art. Porte), several bands of reliefs with figures smaller in scale as those superposed lintels are multiplied. In the 14 th century the sculptures of the tympanums are more and more absorbed by the geometrical forms of architecture. About the end of the 15 th century the mullions project from the tympanums by statues and pinnacles, that extend even to the crown of the archivolt. The mullion is then no longer a support, but a sort of buttress, a very ornamental pier that divides the doorway, its lintel and tympanum, into two parts.

In spite of the rigidity of its principles, the architecture of the middle ages (and one has occasion to recognize it in t the course of this work) avoids monotony and commonness, what is termed pattern in the language of the arts. Rarely does one find in the conceptions, even the commonest, those botches or insignificant fillings, so frequent in the monuments that we erect today at great cost. The luxury of the materials and exaggeration of expense do not compensate for lack of invention and poverty of idea; our masters of the 12 th and 13 th centuries appear to have been fully impressed by that truth. Thus while remaining subject to the fundamental principles of their art, they knew how to deduce the most varied results; th therefore the most attractive and most novel in the eyes of t the people.

In Art. Poste we give very numerous types already arranged in

very varied fashion; but we are compelled here to follow a method and to exclude the exceptional cases, that however furnish precious examples of what real genius knows how to derive from the reasoned application of a true principle. We shall p proceed with one of those examples, as must have proceeded an architect of the 13 th century, so as to make understood the critical method of those masters, to whom cannot be refused knowledge and modesty, for which we do not have the courage to reproach them.

Note 1.p.334. Few orchitects of the middle oges in France inscribed their nomes on the monuments thot they erected, controry to the custom of their Itolion colleogues. This indifference or excess of modesty hos been mode their reprooch by o celebroted critic os o confession of inferiority. Still it would seem thot it is the work thot must be judged, ond thot the nome of its outhor hos nothing to do with the motter.

It is known that to relieve the lintels of doorways, the architects terminated the jambs by corbels that diminished by their entire projections the spans of those monolithic lintels (Fig. 2). Although these lintels A were recieved by the archivolts B, yet they still had to bear the tympanum C; sometimes they broke under that load, especially when they were not made of resistant stone. If instead of the corbels D, we place two stone brackets E abutting at F, it is evident that the lintel is completely relieved, and that its height between beds can be much reduced for the benefit of the tympanum. By reasoning thus, the a architect author of the south doorway of the church S.Severin at Bordeaux must have proceeded (Fig. 3). The lintel of this doorway is actually reduced to the height of a band. Below, t the corbels are replaced by a trefoil arch with spandrels covered by a delicate sculpture of vines in the midst of which birds are playing. An inscription giving the date of this doorway (1247) surrounds the trefoil arch. Above on the lintel is placed the sculpture of the last judgment; then in the upper tympanum is Christ seated on a throne and showing his wounds, assisted by two angels bearing the enstruments of the passion, and implored by the Virgin and S. John. On the voussoirs are bands of leaves, martyrs, and virgins. On the splayed jambs and developed laterally between the little columns in the height of the spandrels of the arch, are the aportles, the Church and the Synagogue.

This doorway is accompanied by two blind arches with tympanums in which are represented scenes from the life of S. Severin. The entirety of that composition given in Fig. 3 is very remarkable and produces a great effect. At A we present at large s scale one of the spandrels of the trefoil arch, in a design both original and graceful. Its sculpture is flat like embroidery, but is delicately treated, and must have produced all its effect, before this doorway was sheltered under a later porch. The programme is further that of many church doorways; yet one sees that the architect by this development of the corbels supporting the lintel, has known how to derive from it an entirely n novel method. Did not the author of the doorway of S. Pierre-sous-Vezalay likewise derive a new mode of composition of the tympanum of the central doorway (art. Porte, Fig. 65), then suppressing the lintel and replacing it by a development of t the corbels? Later, about the end of the 14 th century, the lintels supporting the tympanums were frequently replaced by segmental arches. The corbels were thus suppressed; these segmental arches rest on the jambs and on the mullion with a pronounced projection and placing its crowning before the tympanum, most frequently perforated and filled with glass. Subjects in full relief that usually fill the tympanums of the 13 th century thus give place to a transom filled by glass. As we have stated, Ch Champagne first adopted this method after the 13 th century. The doorways of the westery facade of the cathedral of Rheims prove this. In this case the lintel supports an actual window with its colored glass instead of reliefs. Yet it seems that the arrangement of solid tympanums decorated by subjects in full relief is preferable to these windows. In fact the voussoirs decorated by statuettes form an enclosure, a sort of halo to t the principal decorative subject of the tympanum; if this tympanum be empty, these rows of voussoirs no longer have any reason from the poin of view of iconography. The masters of the best period in Ile-de-France so understood it. But the beautiful iconographic conceptions already changed in the adjacent provinces after the middle of this century, and architects often no longer admit sculpture as a motive of decoration, without occupying themselves too much with the unity of the general compositions. We do not make this a reproach to them, for in the religious edifices that we erect, it is rare that the

statuary from the studios of different artistsl executed on s separate ordersl presents an iconographic entirety directed by one idea. Admitting that each figure or each relief may be a m masterpiecel this defect in the general conceptionl,this lack of unity in intention produces a very sad effect. It must be stated that the clergy being scarcely familiar with these questions and occupied with other interests, perhaps more important from the religious point of view, no longer gives those beautiful programmes of figures, that are so complete and so broadly conceived in the great churches of the royal domain from 1130 to 1240. Their taste no longer led them to love the beautiful and serious statuary so well arranged during our best period of the middle ages. The pretty, slightly heavy, imagined in the 16 th century by the school of the Jesuits, or the Italian style of the late Renaissance, always dominates in the minds of t those persons, who by their position in the Church could contribute to restore to the works of religious statuary the virility and beautiful style, that they have lost.

Yet some of those compositions of tympanums of the 15 th century do not lack grandeur. Among others, we shall lite the tympanums of the principal portal of the cathedral of Tours, which dates from the end of that century. That of the central doorway (Fig. 4) is tracery, with a sort of double lintel or rather double imposts and segmental arches. The middle mullion projects the statue, its canopy the archbishop's cross above it in front of the glazed window. Thus we repeat, as a mode frequently adopted at the end of the middle ages and until the 16 th century. In our Art. Porte is found a very great number of compositions of tympanums, so that it is not useful to emphasize here the decorative system of these members of the architecture of the middle ages. We shall only say a few words of the spandrels of arcades between their archivolts. Ornamental sculpture or s statuary plays an important fart in these spandrels, usually of small dimensions. Thise sculptures are made to be seen near, are treated with love and are skilfully composed in view of t the places they occupy. Very remarkable spandrels of arcades a are seen; on the portals of the church Notre Dame la Grande of Poitiers; at the cathedral of Angoulems (12 th century); on t the S. Chapelle of the palace at Paris; on the portals of the cathedrals of Paris, Bourges and Auxerre (13 th century); in

the chapels of the nave of the cathedrals of Bordeaux and of Laon (14 th century) etc. (Arts. Ange, Arcature, Autel, Cloitre, Sculpture, Triforium). When these tympanums are of small dimensions, they are filled by fanciful animals.

UNITE. Unity.

In every art conception, unity is certainly the primary law, that from which all others are derived. In architecture that law is perhaps more imperious than in the other arts of design, because architecture groups all those arts that compose an entirety with them to produce an impression; architecture tends to a supreme result; to satisfy the need of mankind. The idea of the artist in composing any edifice whatever, must never lose sight of this end to be attained, for it does not suffice for its composition to satisfy materially this need, it is necessary for the expression of that need to be clear; now this expression is the visible form, the grouping together of all the arts and the industries to which the architect has recourse to perfect his work. The more complex a civilization, the greater the difficulty to compose allording to the law of unity; this difficulty increases with the mass of the knowledge of preceding arts, of traditions of the past, from which the thought of the artist cannot be diverted, that obsess him, impress his judgment, and so to speak, carry his pencil into grooves already traced.

One of our predecessors, whose writings are justly esteemed, has said:- "Thus it is necessary for a monument to emanate from a single mind, which combines its entirety in such a manner, t that without changing the harmony, one can neither omit nor add anything to it, nor change anything."[1] One can say it better, but it will be understood that it is difficult for an architect to fulfil that programme, when to express his idea, he must dr draw from very different sources. We freely recognize that many architects in our days do not admit the law of unity, that they deny its power and extol a sort of vague eclecticism, allowing the idea of the artist to seek in the past, at the North or South, suitable expressions to give a form to that idea. These artists declare that from that mingled heap of documents will arise the architecture of the future. Perhaps; but while waiting, that of the present only most frequently expresses disorder

and confusion in ideas.

Note 1.p.340. Quotremere de Quincy. Dict. d'Arch. Art. Unite.

We are not of those, who deny the utility of the study of former arts, since it is given to no person to forget or to cause to be forgotten the long series of the traditions of the past; but what every reflecting mind must do with that mass of materials is to place it in order, before thinking of utilizing them. What does one do that inherits a rich library, if not at first to classify its elements in methodical order, so as to be able to use it on the day when he needs it? It is again essential, that after this first classification, he makes at least an analytical summary in his head of each work in the library, in order to select and profit judiciously by his choice. Among all architectlural styles that merit being mentioned in the history of the world, not one does not proceed according to the law of unity. On what is based that law of unity? That is what it is proper to investigate firs. The needs that architecture proposes to satisfy are very varied. It is always necessary to shelter man, either as a family or an assembly, and to allow him under this shelter to devote himself to his occupations, or to fulfil functions more or less extended, according to whether his social condition is more or less complex. If these primary conditions differ little, the mode of satisfying them is very variable. Indeed the shelter may be made of wood or of stone; it may be excavated in tufa or fashioned in the earth; it can be composed of parts juxtaposed or superposed; it can have a temporary purpose or defy the effect of time. Then art intervenes and the law of unity is established, naturally because everything in the created order exists only by unity of intention and conception. One desires to build a wooden cabin and fells trees; unity of intention. One combines those trees by u utilizing their properties; unity of conception. Whatever one may say or do, then first on construction is established the law of unity in architecture, whether this concerns a wooden hut or the Pantheon at Rome. Nature has never proceeded otherwise, and it is more than rash to seek laws outside those it h has established, or rather to relieve ourselves from those laws, we that form a part of them. Discoveries in the physical sciences show us daily with more evidence, that if the order of created things manifests an infinite variety in its expressions,

it is subject to a number of laws more and more restricted as we penetrate farther into the mystery of movement and life, and who knows if the last limit of those discoveries will not be the knowledge of one law and one atom! In brief, creation is unity; chaos in the absence of unity.

On what shall be established the law of unity, if not on the structure, i.e., on the means of building? Would it be on taste? But in architecture is taste anything more than the proper use of the means? Should it be on certain forms adopted arbitrarily by a people or a sect? But then if we have beside those forms other forms arbitrarily adopted by another people or sect, we shall have two unities. We see the architecture of the Hellenes perfectly conformed to the laws of unity, because that architecture never falsifies its means of construction; likewise among the Romans,(concerning monuments built in the Roman manner); also among the western peoples in the middle ages during the 12 th and 13 th centuries. Yet those monuments are very unlike, and they are unlike because they opey the law of unity b based on construction. The mode of construction changing, the form necessarily differs, but there is not a Greek unity, a Roman unity, or a unity of the middle ages. An oak does not resemble the stem of the fern, nor a horse a hare; yet plants and animals obey the organic unity, that governs all organized individuals.

In fact, unity can only exist if the expressions of that art are derived from a natural principle. Unity cannot pe a theicy or formula; it is a faculty inherent in the universal order, a and that we likewise see adopted as well in the movements of the planets as in the smallest crystals, in plants as in animals. M. Quatremere de Quincy in his Dictionnaire d'Architecture [1] distinguishes in the art of architecture "different sorts of partial unities, from which result the general unity of an edifice." That author thus arranges what he terms partial unities, but without defining what a partial unity may be.

Note 1.p.341. Quot. de Quincy. Dict. d'Architecture.

"Unity of system and of principle.
Unity of conception and of composition.
Unity of plan.
Unity of elevation.
Unity of decoration and of ornament.

Unity of style and of taste."

The illustrious author of the Dictionnaire d'architecture d does not hell us how unity of system differs from unity of conception, nor how those two unities can be separated from the unity of style and taste; how the elevation of an edifice, that seems to be derived necessarily from the plan, still possesses its unity distinct from that controlling the composition of t the plan. We think that unity possesses that quality of not being divisible, and what can be divided is plurality. That column of six unities (and we do not see why that number is retained) precedes the paraghaph in which it is state, that unity of system and of principle does not permit placing arches on columns, nor a Corinthian capital on an Ionic column. This seems to be a very solemn preamble to a slender conclusion. Yet farther on the author of the Dictionnaire, in reference to the unity of elevation, writes these lines that cannot be submitted too much to the reflections of the architect; "What particularly constitutes in architecture the unity of elevation, is first such a correspondence o the exterior of its mass with the interior, that the eye and the mind perceive there the principle of order and the necessary connection, that have determined the mode of existence. The principal purpose of a facade or elevation of a building is not to present combinations or compartments of forms that amuse the eyes. There as elsewhere the pleasure of the view, if it does not proceed from a need or a reason of u utility, far from being a source of metrit and of beauty, is no more than a brilliant fault. But there as elsewhere, the g greater number is mistaken in the transfer of ideas, i.e., in subordinating the need to the pleasure. Hence that multitude of elevations of edifices, whose forms, combinations, arrangements, orders and ornaments, contradict the principle of unity based on the nature peculiar to each thing. What is then important to the unity of which we speak, is not that an elevation may have more or less parts, more or less ornaments, but that it may be such as willed by the kind, nature and purpose of the edifice; that this corresponds to the reasons, constraints and needs, t that have determined its internal arrangement; that the exterior of this edifice may be combined by the visible bond of unity in the manner that the needs of the interior have required." Happily, we do not have to harmonize the opinions of the former

perpetual secretary of the Academy of Fine Arts with the teachings derived from the architectural works left by the past and present members of the learned assembly. those are family affairs; we only show that this definition of the unity of the elevation at bottom may be applied to architectural works, without its being useful to divide that unity. To never deceive at need, in the arrangement imposed by that need, in the means that furnishes the material of the work, in the requirements of construction, these are the first conditions of unity in architecture, and these conditions cannot separate the plan from the e elevation, the conception from the style.[1] We no longer conceive an architect as making a plan without foreseeing the elevations given by that plan, than we could conceive shadow without light, or light without shadow. Further, what does one understand by unity of plan? Is it that each part of the edifice projected on a horizontal plane has the necessary dimensions, that these may be placed as these are expressed, that they fully satisfy economy, durability, orientation, internal and external appearance? That each part cannot be arbitrarily enlarged, dimensioned or changed, without the result of something less good? That the solids be not in accordance with what they must support, and that the mode of building be in harmony with the materials to be employed and with local customs? If that be what is meant by unity of plan, it is very good, in our opinion; but we cannot comprehend the conception of a plan so drawn without the simultaneous conception of the elevations; for to take matters in fact, the plan is only the horizontal projection of w what is termed the elevation; now how can one conceive and draw that horizontal projection of something to be created, and that does not exist? But if by unity of plan is meant an image traced on paper according to certain symmetrical principles, a sort of embroidery design pleasing the eyes by certain balancing of masses, of solids and voids, otherwise torturing the requirements to be satisfied by every edifice, so as to render this image m more agreeable, they we confess to not understanding that unity; but we comprehend that this unity can be distinct from the unity of elevation, since it has nothing to do with the requirements to be satisfied, with the mode of building, with the nature of the materials to be employed, with economy and good sense, that seem to order nothing to be done in architecture, that does not

have a reason for existence and canno be justified.

Note 1.p.343. See Arts. Gout, Style.

There is one sole means of giving unoty to an architectural work; this is that the programme and the forces being known — we mean by forces the resources in men, money and materials, -- to find the combinations that permit satisfying this programme, and of employing those forces in a manner to make them produce the most complete result. It is evident, that if to satisfy his fancy the artist devotes a notable part of the resources at his disposal to one point of an edifice for producing an effect to the detriment of the others; that if his edifice presents specimens of all means of construction and of ornamentation from a love of eclecticism; that if he deceives in the construction furnished in his time to imitate forms belonging to a past fashion' that if the monument erected by him has no connection with the customs of the time; if he shocks those manners by arrangements belonging to a different civilization or another climate, his waste cannot pretend to unity.

Unity alone exists when there is an intimate relation between the architecture and the object. A Doric temple presents a type of architectural unity; but if you make of a Doric temple an exchange or a church, the unity is destroyed; for to appropriate that edifice to a purpose different from that for which it was erected, it is necessary to torture its arrangementr and to destroy what constitutes its unity.

We cannot repeat too frequently, that only by following the order that nature itself observes in its creations, one can in the arts conceive and produce according to the law of unity, which is the essential condition of all creation. If in the order of created things, one has sometimes believed that he saw deviations from the principle of unity, a more profound study has always shown that on the contrary the exception confirms the rule, and it is one of the glories of modern science to have joined by observation more and more the universal organism to the law of unity, which cannot and does not prevent that organism from being infinitely varied.

We say, proceed the same in architecture; start from the principal one, have bu one law, truth; alway truth, from the first conception to the final expression of the work. We add, that here is an art, the Hellenic, that proceeded thus at its

origin and had left immortal works; there is another art under a different,civilizationl our own, in another climate, ours, t the art of the French middle ages, that proceeded so at its o origin and has left immortal works. Yet these two expressions of unity are dissimilar. Then it is necessary to proceed according to the same law to produce an art.

With blind persistence, which often gives to a defect of underestanding the defect of bad faith, men repeat to us:- you pretend to cause us to adopt today the forms adopted by the masters of the middle ages; why those rather than others? All are good to us, and all can serve us, for all belong to the domain of humanity. We reply; the objection starts from a primary idea lacking analysis. Since the 16 th century we have taken in France forms produced in architecture by the application of the p principle of unity in certain conditions, for unity itself, w without referring to the law from which result those forms. M Men have believed that they satisfied the conditions of unity because they more or less faithfully adopted certain forms of architectures preceding our time, forms that were the results of the principle of unity, but which because being the consequences of a principle, are not the principle. Those that have had the habit of proceeding thus, i.e., of taking the form without taking into account the principle that produced it, cannot admit tha one could proceed otherwise; and seeing us study and analyze the applications of the general law made by the masters of the middle agesl they admit that we must proceed as those did, i.e., that taking the form and merely the form in relief of the architecture of the middle ages, we regard this form as our preferred unity, and that henceforth we should have that claim to prescribe the use of that form.

To be clearer, let us resort to a comparison that each can understand. In inorganic nature beneath our eyes, there is an innumerable quantity of crystals, that are the result of a law of crystallization. To reproduce the relief appearance of those crystalsin any material, or to establish physical or chemical conditions by the aid of which those crystals can shape themselves under the empire of the general law, are two very distinct operations. The first is pureln mechanical and merely gives t the result without import; the second places an attribute of creation at the service of human intelligence. The question is

then reduced to its most striking expression; to copy in any material whatever crystals, that are the product of a law regulating crystallization; or to seek the law, so that by applying it there result naturally the crystals suitable for the material employed. To find that law necessarily requires one to define the properties of these crystals, to analyze their substance and the conditions under which they take the form that we know for them. And would one be well received in the domain of science by saying to a chemist, that seeks the law of crystallization, that he pretends to cause us to live in a geode?

Unfortunately, what is not permitted in the domain of science, is allowed without scruple in the domain of architecture, because of the obscurity long thrown over that art and its principles. Architecture is not a sort of mysterious initiation; like all the products of the mind, it is subject to principles that have their seat in human reason. Now reason is not multiple, b but is one. There are not two ways of being right in a proposed question. But the question changing, the conclusion given by r reason is modified. If then unity must exist in the art of architecture, this cannot be in applying a certain form, but by seeking the form, that is the expression of what reason prescribes. Reason alone can establish a bond between the parts, put everything in its place, and give the work not only cohesion, but the appearance of cohesion, by the true succession of the operations that must constitute it. However large a part one desires to leave to the imagination, there is only the way traced by reason, for constituting a form. Geniuses have never proceeded otherwise, and their works only charm us, because they take possession of our minds or hearts, in passing by way of our reason.

Our monuments of the middle ages especially possess unity; 1, because they fulfil exactly, scrupulously and servilely, the given programmes, and which are thus the most vivid expression of the civilization within which they were built; 2, because their form is only the combined result of the means employed; 3, because all their parts are conceived in a manner to satisfy the needs for which they were erected, and to ensure their stability an. duration; 4, because their decoration proceeds according to a logical order and is always subject to the construction; 5, because that construction itself is sincere, that it

never conceals its procedures and employs only the forces necessary.

Our monuments of the middle ages do not have six units, but they have unity. The Articles of the Dictionnaire sufficiently emphasize this quality, we believe, so that it may not be necessary to extend farther on its importance.

VANTAIL. Leaf of Door.

A leaf of joinery turning on hinges or pivots, and closing t the opening of a doorway. It was customary in Grecian antiquity often to hang the leaves by means of two pivots on the muntin or style of the rebate. Those pins entered two round holes made under the lintel and at the end of the threshold. This primitive procedure required the leaf to be set in constructing the doohway. One still sees leave so hung at the doors of monuments in southern Syria, that date from the 4 th and 5 th centuries. It is necessary to know that those leaves are of stone, (generally basalt), and that it was impossible to hang them o otherwise, since one could not attach hinges. Yet this method was applied in Gaul to wooden doors, and we find that tradition retained until the end of the 16 th century it for rustic structures, notably in Nivernais and in Auvergne.

Those primitive leaves consist of a hanging stile A (Fig. 1) made of a branched tree, so as to make the upper rail B of the same piece. This upper rail enters at C a strike stile D, that also receives the tenon E and a bottom rail. Thick planks are pinned on this frame, that is only visible in the interior. The two pins a and b ente cylindrical holes a′, b′, made in the sill and in a stone belonging to the jamb. There is not a nail in that construction; the whole is held by wooden pins. This sort of leaves is generally doubled, and the strike stiles stop at the sill anf on the upper lintel of wood. They were fastened inside by a wooden bar entering the notches G pinned on the end stiles. There is every reason to believe, that this form of l leaf belongs to the Gauls, since one still finds in the private structures of the Gallo-Roman epoch, traces of these cylindrical holes intended to receive the pins of the stiles. It is readily understood that this rude means of hanging the leaves was defective. The pins of wood turned hard in the holes b′ in the stone; if the doors were very large in dimensions, it was neces-

necessary to employ much force to swing the leaves. From the Gallo-Roman epoch hinges were in use, since they are still found, and that means of hanging doors was generally adopted after the Carlovingian period. (Art. Serrurerie). However the leaves were composed of members on which were generally laid bands, if the doorways were of sufficiently great dimensions.

The system of relief to prevent the leaves from sagging, i.e., from deflecting in their width under their own weight, is always adopted; men even sometimes used during the 12 th century branched timbers to form these braces, or at least one of them; and the iron hinges are either visible on the exterior on the planks, or are set between them and the frame, as in the example given here (Fig. 2), which is taken from a door of the old church of S. Martin of Avallon. One sees in this Fig. presenting one of the leaves seen inside, that the hanging stile A is cut from a branched tree. Boxings B and C are cut in that stile to receive the feet of the braces, that relieve the end of the top rail D and the strike stile E. The short brace G connects this stile and the bottom rail H. The iron hinges are placed between this frame and the external boarding, which only shows the pins holding the braces and the heads of the nails fastening them to the hinges. This work was rude and yet was very well understood from the point of view of stability and use. Soon the execution became more refined, and the leaves received various sorts of external decorations, either by the attachment of hinges of wrought iron, by coverings of finely wrought bronze, or by paintings, heads of nails, plates of bronze or of wrought iron. These decorations habitually depend on the construction. Thus for example in Fig. 3, that we give here, [1] one sees that the system of construction of the leaf, composed of a lattice between the stiles and rails, externally reproduced on the boarding by a lattice of narrow mouldings (see detail A), beaded and with nail heads at the intersections. Those nails pass through the mouldings as indicated by profile B at C. The heads of the nails are ornamented by an ornamental washer of wrought iron. (See G). As in the preceding example, the hinges are set between the framework and the boarding. It is well understood that the framework is inside. The lattice mouldings are nailed on the boarding and correspond to the bracing lattice. The boards are thus maintained perfectly by the ornamental system, and t

the nails consolidate the halved latticed braces. These wooden bars mrossing both ways and nailed together cannot yield, and the stability of the work is complete. This decoration applied externally on the boarding is not always a reproduction of the framing; it often consists of mouldings nailed on according to certain geometrical compartments, as the Arabs practised from all times with forms borrowed from architecture, such as bands, arcades, gables, etc. [1] One still sees on the leaves of the western doors of the cathedral of Seez applications of this kind, that represent a sort of grille composed of rows of finely made little arcades, The rows of arcades are six in number in the height of the leaf, including the crown (Fig. 4), and are simply nailed on the boards that they keep flat. At A is traced the detail in section of one of these arcades with its little column, at B being a section of that. The little columns, their capitals and rings are turned. The rows of arches are cut in a plank and nailed, as indicated by our sketch. All that de decoration was painted in strong colors, as well as the ground.

Note 1.p.349. Taken from the leaves of the cathedral of Coutances, and from a door now destroyed, that was seen beside the church of Mont-S.-Michel-en-Mer, 13 th century.

Note 1.p.350. Art. Menuiserie, Fig. 12.

There is found in Art. Menuiserie a very great variety of th these decorated leaves, both by applications and by combinations of joints. [2] We do not think it nede sary to enlarge further here on works in wood.

Note 2.p.350. Art. Menuiserie, Fig. 12.

It also occurred that the leaves of doors were covered by p plates of metal, bronze or wrought iron, this being independent of the hinges. [3] One still saw on the left doorway of the western facade of the abbey church of S. Denis at the beginning of the last (13 th) century, leaves of doors brought from Poitiers by Dagobert, and that were covered by perforated plates of bronze representing scrolls with animals. Thisi leaves had been replaced on that facade at its reconstruction by abbot S Suger, as works worthy to be preserved. [4] The monks of the chapters destroyed a good number of these precious objectr since t the reing of Louis XIV, and the revolution of 1792 cast into t the crucible what remained, so that today in France only with great difficulty have been found some traces of those leaves

covered by metals more or less skilfully decorated. Some remains of wrought iron have alone escaped these devastations because of their small value. Doors of treasuries and of shrines yet allow their coverings of wrought iron to be seen. Those coverings are always made of bands of iron, for sheets were not made then; only by the hammer could one obtain thin iron of small dimensions. These bands were most frequently placed as lattices with a nail at each crossing. Fig. 5 represents one of those leaves covered by crossed bands of wrought iron connected by n nails with rosettes forming washers. At A is given one of those rosettes, at B is the section with the crossed bands, and at C is the section of the edge border. [1] This sort of leaves have only moderate dimensionss In Fig. 5 between the crossed bands is seen the wood, but it was not always so; ornaments of wrought iron were cut out and sometimes placed in the intervals of those bands (Fig. 6); they form rosettes held at the centre by a nail and by bands, under which were pinched their ends. Thus the wood of the leaf was almost entirely covered by a solid armature composed of a rich ornamentation. The fragment that we give appears to date from the 14 th century, and c comes from the collection of drawings of the late Garneray. The leaves were also horizontal boards placed to lap. Those bands were plain or were cut out in the form of scales or of lambrequins (Fig. 7), held on each other as indicated by section A and by strong nails penetrating the wood. This leaf was attached to a door of the abbey of S. Bertin at S. Omer. [2] It likewise appears to belong to the 14 th centurw. Thus (except the ornaments) were habitually covered the leaves of the posterns of cartles, and sometimes even of private habitations. Men most frequently contented themselves for the doors of houses and m mansions with heads of nails more or less wrought (Art. Clou), set in quincunx or according to the rails or braces on which were attached the boards.

Note 3.p.350. See some examples of these hinges in Art. Serrurerie.

Note 4.p.350. On the old strike stiles of the church, that king Dagobert caused to be built, this was inscribed in very old interlaced letters, quite difficult to read. (Latin inscription). D. Doublet, Antiq. et rech. de l'abb. de S. Denys en France. Book I. Chap. 33.

Note 1.p.352. There still exist leaves of this kind at Sens and Rouen (cathedrals). We have seen them in many churches, f from which they were removed twenty years since, probably because of their decayed condition. The example given here was dr drawn by us in a storehouse of old iron at Rouen.

Note 1.p.353. Without any indication of its origin.

Note 2.p.353. Drawing in collection of Gorneray.

As we have already stated above, there remains to us in France no trace of leaves of mediaeval doors covered by bronze; yet several churches possessed them. Dom Doublet speaks of the doors made according to the orders of abbot Suger for the western facade of the new church. It seems that those doors were very richly decorated by sheets of bronze gilded and enameled. "He caused to come " (Suger), says Dom Doublet, "several founders and experienced sculptors, to ornament and enrich the strike stiles of the principal entrance doors of the church, on which were seen the passion, resurrection, ascension and other stories (with the representation of the said abbot prostrate on the ground), the whole being cast; and which was proper to be made at great cost, both for the metal, and for the gold that was also employed for the stiles of the door at the right hand on entering, that he caused to be enriched by metal, gold and enamel, leaving the old stiles of the third door at the left hand, that were from the first building of the church." The inscription in verse appeared on the bronze of the principal doorway. We transcribe it here from Dom. Doublet. (Latin poem).

Note 3.p.353. Antiq. et rech. de l'Abb. de S. Denys en France. Book I. Chap. 33.

And on the lintel over the leaves. (latin poem).

If the Latin is mediocre, the ideas are very beautiful and very appropriate to the object.

In the absence of all graphical documents, we do not seek to give a restoration of this monument that would be so interesting.

One knows the beautiful bronze doors of the Norman basilica of Monreale near Palermo, of the cathedral of Pisa, and of Verona. Those leaves consist of panels in which are placed subjects in low relief with niello and damascined work. It is to be presumed that the leaves of the principal doors of the abbey church of S. Denis were conceived in the same manner. One also sees on the southern side of the cathedral of Augsburg leaves of doors cov-

covered by bronze in panels, that dates from the 12 th century, but contain fragments taken from a much older monument. If one refers to certain vignettes of manuscripts, he could also believe that the middle ages placed on the leaves of doors bronze coverings in horizontal bands like superposed strips, decorated by ornaments and figures.

As for wooden leaves framed in panels, we refer the reader to Art. Menuiserie.

VERGETTE. Iron Rod.

A small square or round iron rod, that serves to support the glass panels between the crossbars. The glass panels are attached to them by means of small strips of lead soldered to the leads of the glass. (Art. Vitrail).

VERRIERE. Stained Glass Window. (Art. Vitrail).

VERROU. Bolt. Art. Serrurierie.

VERTEVELLE. Catch. Art. Serrurierie.

VERTU. Virtue. (Figure).

The iconography of the middle ages frequently placed in parallel the personifications of virtues and vices. The antagonism of good and evil, as all know, is one of those ideas accepted among nearly all peoples of the superior races. We see it manifested in the Vedas, among the Iranians, the Egyptians, and d during pagan antiquity. Semitic monotheism must necessarily reject that double influence, that was the foundation of pantheism, so to speak. The Jews accepted no power as a rival to their Jehovah. For the Jews, sin was only an infirmity attached to man, but was not assumed to be inspired by a power superior to him. It is true that Genesis makes the serpent interfere between the first man and the first woman; "the serpent was more wily than all the animals of the earth that the eternal God had made; he said to the woman, etc." In that example is nowise a question of a rival power, of the spirit of evil. The serpent gives perfidious advice; it stated that a spirit had assumed its form, that he had an interest in it, that he must profit by it; no spirit advised Cain to slay his brother. The Eternal, seeing

Cain dejected when his sacrifice is rejected, says to him:- "Certainly if thou dost well, thou shalt be considered; sin besets thy door, it desires to reach thee, but thou canst master it." [1] For the Greeks as for all peoples of Aryan race, evil was a natural force like good, a rival force, necessarily conquered but immortal, fighting without truce, independent and venerated on account of its divine quality. Man was only a s sport between these two powers, invoking the intervention of the good against the acts of the evil, but never believing that his personal will could struggle against the latter. Pantheism -- we speak of the primitive pantheism based on the observation of natural phenomena, and not of the enervated and superstitious pantheism of the later times -- regarded the action of the divine forces as acting well above frail humanity, as engaging in contests and exerting its power in a sphere far superior to human interests. Man was fatally subject to decrees, whose motives he could not penetrate, and if he invoked the gods, this was never with the hope of their modifying in his favor the c course of affairs. Semitic egoism admits that Jehovah stopped the progress of the sun to allow Joshua to crush his enemies; one finds no analogous legend in the entire religious history of the Aryans. For them the forces of nature act in the fullness of their independend power. A divinity can struggle against the sun, but cannot command it to stop in its course.

Note 1.p.355. Genesis, Chap. 3. Translation by Cohen.

Note 2.p.355. Genesis, Chap. 4.

This preamble was necessary to explain a philosophical phenomenon produced in the Christian iconography of the West, about the end of the 12 th century. Then the artists were evidently inspired by the ideas of the time, and did not absolutely cause the spirit of evil to interfere; they admitted the good and bad qualities inherent in man, and personified them. This is a limited pantheism in the human soul instead of having the universe as its seat. It is evident that the word pantheism here cannot entirely express our thought; men do not adore Charity or Courage but personify them; give them a body and attributes, sometimes even a halo; and if they do not worship these metaphysical abstractions, the multitude comes to regard them as forces possessing a sensible form of divine emanations. It must further be stated, that if the virtues are personified, the vices in

opposition to the virtues are represented by an act and not by a personage; at least this is the most general case. Before t the lay school of the end of the 12 th century, the virtues like the vices are represented by acts taken from the Scriptures. In the representation of vices the devil always intervenes; he advises and presides over the execution of the evil deed, while the spirit of evil no longer appears in the representation of vice opposed to virtue, after the end of the 12 th century. Thus on the jambs of the central portal of Notre Dame of Paris are carved in the mediallions 12 virtues, represented by 12 women bearing certain attributes; the vices in contrast are sculptured beneath those medallions, and are represented by s scenes. Examples; Faith is placed next at the right of Christ and bears a shield filled by a cross. Below a man kneels before an idol. Courage is the first virtue at the left of Christ and is clad in complete armor; a coat of mail over her robe, helmet on head, a buckler on her left arm, on which is a lion rampant, a naked sword in her right hand. Beneath is Cowardice, a man fleeing from a hare; he turns around frightened and drops his sword.[1]

Note 1.p.357. Here are the virtues represented on thise jambs with the vicoous acts opposed to them. -- On the right of Christ:- 1, Faith. Below the adoration of an idol. -- Hope, a draped woman bearing a standard on her shield. Below a man transfixed by his sword. -- 3, Charity, holding a sheep on her lap, figure mutilated. Below, Avarice holding a purse and locking bags in a coffer. -- 4, Justice, a salamander covering her shield (figure destroyed). -- 5, Prudence, her shield bears a serpent coiled around a staff. Below a wandering man with rent garments, holding a torch in his right hand, and in his left a horn; this is Folly. -- 6, Humility, on the shield an eagle l lighting. Below, Pride represented by a man on a fiery horse, that casts him off backward.

On the left of Christ:- 1, Strength. -- 2, Patience, an ox on her shield. Below, Anger, a woman with flying hair chases a religious with a stick. -- 3, Meekness, a lamb carved on her shield. Below, Harshness, a crowned woman seated on a throne kicks a suppliant kneeling before her. -- Harmony, her right hand u unrolls a scroll on which she looks; her left holds a cartouche on which is engraved a lily and an olive branch. Below, two men

are fighting. -- 5, Obedience, a kneeling camel is seen on her shield. Below a man makes a gesture of contempt before a bishop that exhorts him. -- 6, Perseverance, a crown suspended in the shield. Below a religious leaves his monastery. (See Description de Notre Dame de Paris, by M. Guilhermy and Viollet-le-Duc. 1856).

Only about the end of the 12 th century, as we previously s stated, appear on our monuments these representations of the virtues, and among those sculptures may be cited as the oldest, those that decorated the base of the left doorway of the facade of the cathedral of Sens. They show Munificence, opposite being Avarice. Munificence (Fig. 1) is a draped woman, crowned and seated. With her hands she opens two coffers filled with bags of crowns. Two lamps in form of crowns are supported beside her; at her feet are two vases of flowers. Avarice (Fig. 2) is one of the beautiful sculptures of that epoch (about 1170). With hair flying under a piece of cloth, the left hand bent, she is seated on a coffer that she has shut violently with the right hand; under her feet are bags filled with crowns. A Avarice is personified here. [1] (Old French poem).

Note 1.p.358. Thus a troubadour of the 13 th century describes munificence and Avarice. (Old French poem).

William Durand states that the virtues are represented under the forms of women, because they nourish and caress men; [1] But again the artists of the middle ages gave them an energetic and militant character. In the stained glass of the great western rose window of the cathedral of Paris, the virtues are armed with lances and fight the vices, sometimes represented by historical personages. Sardanalapus represents Folly; Tarquin, Licentiousness; Nero, Iniquity; Judas, Despair; Mahomet, Impiety,etc.

Note 1.p.360. Latin note.

At the cathedral of Chartres the artists of the 13 th century have given to the representations of the virtues the most complete development. There [2] the virtues are not opposed to the vices, but extend on foot on the voussoirs, and are divided into three rows; public virtues and private virtues. The virtues of the private man are placed on the inner voussoirs, the virtues of the public man are on the outer voussoirs; on the intermediate voussoirs are sculptured the domestic virtues. Each series contains 14 figures, commencing with the right hand vous-

voussoir. At Chartres the public virtues present great iconography interest. The first has lost its title; its buckler is charged with roses. Didron[3] regards it as personifying Memory. The second (Fig. 3) represents Liberty; her shield is charged with three crowns; she holds a lance in her right hand. The third is Honor; her shield is charged with mitres. The fourth has lost her title but is Prayer, according to Didron; in fact on her shield is sculptured an angel holding a book. The fifth is Adoration; the angel holding a censer charges her shield. T The sixth is Promptness; three arrows charge her shield. The seventh is Courage; on her shield is a lion rampant. The eighth is Concord; her shield is charged by a pair of doves. The ninth is Friendship, with the same arms. The tenth is Power, an eagle holding a sceptre charges her shield. The eleventh is Majesty; three sceptres on her shield. The twelvth is Health;[1] three fishes are on her shield. The thirteenth is Security, a keep on her shield. The fourteenth has an effaced inscription, but is designated by Didron as being Religion; a dead dragon on her shield; a living dragon (symbol of the demon) beneath her feet. This figure holds a standard, and we should more willingly designate her as expressing Faith. All these statues hold lances, crosses or standards in their right hands, are crowned and haloed. The sculpture is in a beautiful style; their bearing is p proud, the heads are expressive and the draperies arranged with art. let us state in passing that Liberty and Promptness or Activity, if you prefer, are regarded as virtues of the first rank, public virtues; and we frankly confess that in the middle of the 19 th century we should not place them on our churches. Could we even sculpture them on our civil edifices? We represent there Abundance, Justice, Industry, or again, Religion, Charity, Faith, Hope, and we give them a famished and slightly silly appearance, that in our times is regarded as the attribute suited to these personifications. The works of our artists of the 13 th century seem to us [illegible], more vigorous and more sane. No one is ignorant that most critics, who by chance desire to say a word on the arts of the middle ages, wilfully confuse schools and epochs without having taken the trouble to e examine the products, even for a single day, and reproduce this stereotyped idea with objections, viz:- that the sculpture of the middle ages is ascetic, puny and oppressed by an enervating

theocracy. We have no desire to see society return to that time, if that were possible; but we wish that our artists would show in their works, and in the idea that directs them, something of that virility so profoundly impressed on the French statuary of the 12 th and 13 th centuries. In regard to religious sculpture, men seek today to satisfy us by some pale idea, blanched, unhealthy and lifeless, a sort of compromise between insipid t traditions badly understood, and a classical canon; while we find in that statuary of our architecture of the 13 th century, overflowing with sap, a need of freedom of the mind that strengthens the heart and pushes the spirit forward. It must be of little importance to us that then the bishops were feudal lords, and that the feudal lords were petty tyrants, if under that regime the artists knew how to elevate the moral side of man to prepare virile generations. Those artists were then in advance of ours, who are too careless of their dignity and submit to the degenerate and senile traditions of the Academy, or the faded religiosity of the sacristies, without daring to express an idea of their own. If the execution in our days is beautiful, so much the better, but it is only a vestment that must cover a living idea, not mannekins from a withered Olympus or the oratory of devotees. Certainly the statuaries of the middle a ages made much religious sculpture, or at least attached to relegious edifices, since a great number were erected. Yet whether this depended on them or on the inspirations that they obeyed -- they never descended to those debasing tricks or those platitudes, that are given out today as religious art. T The virile sculptures of Chartres, Rheims, Amiens and Paris a are proofs of this. It suffices to see them without having a made its decision in advance.

Note 1.p.360. Latin note. (Rat. div. off. Book I, Chap. 3).

Note 2.p.360. Voussoirs at left side of north porch.

Note 3.p.360. See Didron's very interesting Article on the Virtues of Notre Dame of Chartres. (Ann. Arch. Vol. VI, p.35.).

Note 1.p.361. Health is a gift and not a virtue; but it is evident that the word Sanitas is to be understood here in a m moral sense. It is the health of the mind that is meant, not physical health.

In the 13 th century the Church did not reject from the portals of its edifices these civil virtues, Courage, Activity,

Munificence, Liberty, Justice, Friendship, mental Health; near these were represented daily Labor, as at Notre Dame of Chartres; below them are the vices; then the sciences, arts, mental labors. Thus is completed the encyclopedic cycle, that the French cathedral exhibits to the people, as far as permitted by t the state of the sciences of that epoch.

In brief, the Church was then alive and was worthy to live, since it entered into the social movement, that tended to constitute a great nation on the borders of western Europe. Its fi first virtue was to be truly national, to press forward intellectual developments. Whether it could have repented of this; whether feeling itself outran by minds too advanced according to its views, it would have attempted to arrest the movement, that it had itself aroused in the midst of the dioceses, it is no less certain that it then took the initiative, that the arts felt this, and that those arts could not be regarded as enervated, suffocated beneath a mischevious and petty theocracy.

The virtues were not only represented on the portals of churches; they had their places also on the portals of palaces, in the great halls of castles and on the facades of mansions. The knights sculptured on the towers of the castle of Pierrefonds, on those of the castle of Ferte-Milan, are personifications of heroic and warlike virtues. Those figures gave their names to the towers. Thus at Pierrefonds the knights are eight in number, like the towers. Those statues 9.8 ft. high and of beautiful work, are those of Cesar, Charlemagne, David, Hector, Joshua, Godefroy de Bouillon, Alexander and of king Artus.

On the facade of the palace of the Chambre des Comptes built by Louis XII opposite the S. Chapelle of the palace at Paris, were seen four statues of the virtues, which were Temperance, holding a clock and a telescope; Prudence, holding a mirror a and a sieve; Justice, having as attributes a balance and a sword. Courage, that held a tower and choked a serpent. [1] The combat of the virtues and vices was the subject of many paintings and tapestries, that decorated the halls of castles. Romances and inventories frequently mention this sort of hangings designated by the name of moralities.

Note 1.p.863. Dubreuil. Antiq. de Paris. Book I.

VIERGE, SAINTE. Holy Virgin.

VIERGE, SAINTE. Holy Virgin.

About the middle of the 12 th century the worship devoted to the Holy Virgin assumed a particular character in France. Until then the sculptured or painted monuments give to the Holy Virgin a secondary place; she is the woman designated by God to give birth to the Son. She is an intermediary, a divine means, but does not participate in the Deity. If in the 12 th century that dogma did not change, the arts singularly modified its m meaning, and it is well understood, that the arts are only an expression of popular sentiment, that exaggerated or exceeded the dogmatic idea. In causing their cathedrals to be rebuilt in the North of France about the end of the century under an essentially lay [1] inspiration, the bishops believed these should abound in the religious minds of the people. Most of those great edifices were placed under the name of Notre Dame; and the place assumed by the mother of God had an importance entirely novel in the religious iconography. At Notre Dame of Senlis, the story of the Holy Virgin occupies the principal portal; at Notre Dame of Paris two of the portals were reserved for r representations of the Virgin, that on the left of the western facade, and that of the south transept. At Rheims the statue of the Holy Virgin occupies the mullion of the middle portal. At Notre Dame of Chartres one of the portals of the 12 th century is consecrated to the Virgin, etc. The popular sentiment already tended to regard the Virgin as a quasi divine personage, only caused it to be believed. Churches and chapels without number were erected to the mother of the Saviour. Statues abounded not only in religious monuments, but at street crossings, at the corners of houses, on the facades of mansions, on the gates of cities and castles. The representation of Christ before that epoch was admitted to the motives as a divine personage, visible and tangible, while that of the Father was very rarely reproduced (Art. Trinite). That was further conformed to the Catholic dogma; it was natural to represent the Son of God, s since the Father had desired him to descend on earth anf to become man.

Note 1.p.364. Art. Cathedrale.

For example, one sees on a great number of Christian sarcophaguses of the 5 th to the 8 th centuries that Christ is represented in the midst of the apostles in the form of a young and

beardless man. The Father is represented in these sculptures only by a hand projecting from a cloud. As for the Virgin there is scarcely any question, or if she appears, she occupies a an inferior place, even less than that of the apostles. In that the artists conform to the letter of the evangelists. The Virgin begins to take a prominent place only when the crucifixion is represented, i.e., in the West about the 8 th or 9 th century. Then according to the text of the evangelist of S. John, she occupies the right of the cross and S. John the left. In the scenes of the last judgment of the beginning of the 12 th century, as for example at Vezelay and a little later at Autun, the Virgin does not appear, while we see her kneeling on the right of her Son and praying for mankind, in the scenes of the judgment dating from the beginning of the 13 th century.

But before that epoch, i.e., about 1140, she is already seated on a throne and holding the infant Christ between her knees. She is crowned; adoring angels cense the divine Infant. We also see the Virgin represented thus on the portals of the right side of the facades of the cathedrals of Chartres and of Paris, in the tympanums of doorways that date from that epoch. [1] Fig. 1 reproduces the Virgin of the cathedral of Paris, better preserved than that of Notre Dame of Chartres, but similar in pose and attributes. The mother of the Saviour holds the Infant in her lap with her left hand; with the right she holds a sceptre terminated by an iris fruit, she has a halo like Christ; he blesses with the right hand and holds the book of the gospels in the left. The execution of that figure, much larger than nature, is very beautiful, and the heads have a character quite approaching that of archaic Greek sculpture.

Note 1.p.365. It is necessary not to lose sight of this, that the tympanum of the right portal of the western facade of Notre Dame at Paris comes from the church of the 12 th century built by Etienne of Garlande, and was replaced in the construction of that facade at the beginning of the 13 th century.

There is seen in the baptistery of S. Valerien at Rome a painting, that does not seem earlier than the 9 th century, and t that represents the Virgin holding the infant Jesus in her lap; she is not crowned, but her head is covered by a very simple blue veil over a white hood. The Infant holds a roll in the l left hand and blesses with the right in the Grecian mode. (See

catacombes de Rome, by l. Perret. Plate 33).

This mode of representing the Holy Virgin was borrowed from Greek artists; it was a Byzantine importation due to the ivories and paintings, that in great number were brought from the Orient by the crusaders. In those painted or soulptured representations, it is evident that Christ, by the place occupied, a and by his gestures of blessing, is the principal personage; that the Virgin, however revered, is there only as a supporter, the woman chosen to bear and care for the Son of God. The middle of the 12 th century does not leave that arrangement, and one still sees in the abbey church of S. Denis a Virgin in wood of that epoch, taken from the priory of S. Martin-des-Champs, which exactly reproduces that attitude. [2] The Greek archaism, by which these art objects are inpressed, could no longer suit the lay schools of the end of the 12 th century. One again sees the Virgin seated and holding the divine Infant in the middle of her lap (on the axis), according to the Greek fashion, in some edifices of the beginning of the 13 th century, as at the cathedral of Laon, and as at one of the north doorways of Notre Dame of Rheims; then that is all. From that epoch the Virgin is no longer represented as seated and holding her Son in her lap, except in the scenes of the adoration by the Magi. If she occupies an honorable place, she is standing, crowned anf triumphant, holding her Son on her left arm, a branch of lilies (arum) or a boquet in the right hand, or indeed she extends t that hand as if to grant a gift. Her face is calm and she looks forward; to her is the homage addressed. Christ is an infant, that in the earlier monuments still blesses with his right hand and holds a sphere or a book in his left hand, but who later p passes his right arm behind his mother's neck and plays with a bird. The face of the mother smiles and sometimes turns toward the head of the Child. She is the mother in particular, the w woman clothed with a divine character, and indeed she is addressed by the multitude; it implores her, believes in her all-powerful mediation, and the Child is only in her arms to indicate the origin of that power.

Note 2.p.385. There are many other examples in France, both in statuary and in glass, that likewise date from the middle of the 12 th century.

It is well understood, that we do not pretend here in any

manner to discuss the dogmatic question; we merely render an a account of the transformations, that were the result of the lay intervention in the representation of this portion of the sacred iconography. The movement of religious minds toward the worship of the Virgin, acquired during the 13 th century an importance, such that sometimes the high clergy was moved by in; but it was not possible to go to meet it. Men in their prayers rather addressed the Virgin, because in the eyes of believers she was always the compassionate mediator, always indulgent and always heard between the sinner and divine justice. One conceives that this sentiment was for artists and poets an inexhaustible source of subjects. That also suited the French mind, that does not love absolute doctrines, desires alleviations of the law, and freely believes that by the mind, a happy turn or good sentiment, one can cause all to be pardoned.

For the people the Virgin had again become a woman, with her spirit, persistence, active love and tenderness of heart, always finding a means of disengaging one from the worst case, if only implored a little with fervor. [1] To the legends of the miracles due to the Virgin, so numerous in the 13 th century, sometimes poetic and sometimes puerile, there is always a Gaulish side. With a mild and refined dignity the Virgin knows how to cause the devil to fall into his own snares. Artists in particular seem to possess the privilege of exercising the indulgent care of the mother of Christ; musicians, poets, painters and sculptors also emulate in rendering a homage, to which as a woman she could not remain insensible.

Note 1.p.367. See the legend of Theophilus (Rutebeuf). Also see the Livre des miracles de la Vierge, manuscript in the library of the seminary of Soissons.

Always present where her intersection can save a soul or prevent a danger; requiring little, so as to find more frequent occasion of showing her inexhaustible charity; her counsel, when she sometimes gives it, is simple anf never based on recriminations or threats. Such is the Virgin as shown to us by the legends and poems, whose image the sculptors and painters have endeavored to retrace. It will be agreed, that there is one of the most touching creations of the middle ages, and which illuminates the darkest pages.

The Virgin further possesses the privileges of divinity, for

it is by her own motion, and without recourse to her Son, that she accomplishes her merciful acts; she seems to be provided with the most extended power over the things of this world. Extending thus, the worship rendered to the Virgin became a motive of innumerable works of art. The statues of the Holy Virgin made during the 13 th, 14 th and 15 th centuries are counted by hundreds in France, and many are very good, yet those among t these statues that date in the first half of the 13 th century must be regarded as being in the best style. The end of the c century and the beginning of the 14 th have left us several of those works, that from the point of view of grace and the most elegant and refined naturalism are masterpieces. We shall cite the statues of the north portal of the cathedral of Paris, [1] that of the so-called portal of the gilded Virgin at Amiens, a Virgin of oriental alabaster Scathedral of Narbonne); a Virgin of marble (half natural size) in the abbey church of S. D Denis, etc.

Note 1.p.368. Art. Sculpture, Fig. 24; see the head of this statue6

To make understood these transformations of the image of the Holy Virgin toward naturalism, we give in Fig. 2 that of the portal on the right of the western facade of Notre Dame of Amiens, which dates from the end of that century. The first figure is serious, and it extends the hand as a sign of conferring grace. The Infant blesses; his pose is calm and dignified, like that of his mother. The second is entirely occupied with the Child, on which she smiles. The first has the appearance of a divinity; she receives homage and seems to respond to it; she crushes with her foot the head of the dragon with a woman's head, and on the pedestal supporting her are represented the birth of Eve and the fall of Adam. The second statue is a charming mother, that seems to have no other care than to caress the Infant carried on her arm. On examining the two works of sculpture, one measures the distance passed over by the French artists in the space of a century. What they lose in style and the religious idea, they gain in grace, already a little mannered, and in naturalism. The execution of the statue of the gilded Virgin is marvelous. The heads are modeled with an infinite art and a charming expression; the hands are of an elegance and a rare beauty, the draperies are excellent. But this Virgin is

a noble lady entirely happy to be occupied with her infant, a and does not seem to be attacked by that languor, that a certain school of critics believes to gratify the statuary of the middle ages. No more dragons under the feet of the gilded Virgin of Amiens; her halo is richly ornamented by stones and rounded flutes, supported by three little angels of charming work.

During the middle ages, the Virgin is not represented without the Child, except in legendary subjects where she directly intervenes, or in the scene of the assumption. But then she holds in her hand the book of gospels, as if to always connect her with the life of Christ. All somewhat enlightened amateurs know the charming sculpture of Notre Dame of Paris representing the a sumption, [1] and which we have reproduced here in the principal part, i.e., the figure of the Virgin. Six angels raise the halo of clouds that encloses the figure, two others cense at the height of the head. The veil of the mother of the Saviour is coiled in the upper part of the cloudy halo. The Virgin is deprived of her crown at the moment when her body is raised by the angels, since this apotheosis succeeds the coronation by he Son, who stands at her right. The coronation of the Virgin is very frequently represented, both in sculpture and in painting. This is one of the subjects loved by the artists of the 13 th and 14 th centuries. The cathedral of Paris possesses two that are very remarkable; that of the left portal of the western facade, which dates from the first years of the 13 th century, [2] and that of the so-called red doorway on the north side, which dates from about 1260. One also sees on the tympanums of the cathedrals of Senlis and of Paris very beautiful reliefs representing the death of the Virgin. Christ is present at that scene and receives the soul of his mother in his arms. [1]

Note 1.p.371. This sculpture forms a part of the reliefs, that formerly ornamented the cloister of Notre Dame, and that one still sees on the walls of the chapels of the chevet on the n north side. It dates from the first years of the 14 th century.

Note 2.p.371. Art. Sculpture, Fig. 18.

Note 1.p.372. The litanies of the Virgin are sometimes represented on our churches; they are seen sculptured in one of the 16 th century chapels of the curious church of Ferte-Bernard.

The number and nature of the vestments given to the Virgin by the artists of the middle ages are not changed from the 12 to

to the 15 th centuries. The difference is only in the manner of wearing these vestments, that always consist of an ample and l long under robe rising to the neck, with close sleeves and girdle, and a mantle and a veil on the hair and beneath the crown. This veil falls on the shoulders to the middle of the back.

During the 12 th and 13 th centuries, the mantle allows the front of the robe to be seen, and is draped more or less amply over the arms; but about the end of the 13 th century, the mantle extends from one arm to the other across the front, and c covers the robe, of which one only perceives the top of the lower border.

The colors given to the vestments of the Virgin are red and blue; red and sometimes white for the robe, white for the veil and blue for the mantle. The embroideries represented in gold on these fabrics are, the lion rampant of Judah within a circle, small fiche crosses, and the heraldic rose.

VIERGES, SAGES ET FOLLES. Wise and Foolish Virgins.

The parable of the wise and the foolish virgins is sculptured in a great number of our religious monuments. In our cathedrals, the wise virgins are almost always sculptured on the jamb of the principal doorway on the right of Christ; the foolish virgins being on the left jamb. Below the wise virgins, who are generally five in number, is represented a leafy tree, and below the foolish virgins in equal number, is a tree with its trunk chopped by an axe. At the cathedral of Sens, the jambs of the principal doorway possess their collection of virgins, that date from about 1170, although the statue of S. Etienne m may be raised on the mullion; but all leads to the belief, that this statue of S. Etienne was placed there after the fall of the southern tower, at the moment when after the fall, there must remain a good part of the western facade, and that the tympanum of the principal portal was rebuilt. As for us, this statue of S. Etienne occupied the mullion of the right doorway before the ruin of the tower. Its position on the central mullion entirely deranges all the iconography of the older portion of that doorwan, built accompanying the statue of Christ.

At the cathedral of Amiens are seen the wise and foolish virgins sculptured on the jambs of the central doorway, at both sides of the Christ; likewise at Notre Dame of Paris. At the cathedral of Strasburg the wise and foolish virgins are sculp-

sculptured, not in reliefs on the jambs, but occupy the splays. These are charming statues, [1] that date from the beginning of the 14 th century.

Note 1.p.373. Left doorway of the western facade. (Art. Sculpture, Fig. 25).

Those statues of the wise and foolish virgins are especially interesting to study, because they minutely represent the costume of the women of the time when they were sculptured; but it is unnecessary to believe that all statues of the middle a ages reproduce the clothing of the epoch in which they were m made. If some legendary personages, saints of the diocese, bishops, religious and donors are clothed in the costume worn at the time when sculptured, the Virgin, apostles, personages of the Old Testament and those mentioned in the New Testament, are clothed according to a tradition, whose origin is found in the first Christian monuments and among Byzantine artists.

VITRAIL. Stained Glass Windows.

We are no longer in the time when when serious persons pretended that glass was unknown to the Greeks and Romans. All European museums today possess glass objects, that date from high antiquity, and which in perfection of manufacture are nowise inferior to what Byzantium and Venice sold to all Europe during the middle ages.

Asians and Egyptians obtained glass pastes of various colors, and Gaulish tombs yield articles of copper or gold with settings of bits of colored glass, bracelets, beads and collars of vitrified pastes.

Romans employed glass to fill the windows of their habitations. Did they set colored glass in window sashes? We know that they employed naturally translucent materials, alabaster, talc and gypsum, which admitted a tempered light to the in eriors of apartments or monuments; but until now there have not been discovered panels of antique glass composed of glass of different colors.

It must be stated, that in the monuments of the Romans and of ancient Greece, windows were small and scarce. In large edifices like the Baths, for example, daylight was habitually softened by lattices of metal or marble without glass. The vastness of those interiors and the well chosen orientation permitted t

the use of this method without injury by the effect of the external air; the more so since those openings were pierced at a great height, and that they affected the air moving in the lower parts only as a means of ventilation. Besides the Romans and the Greeks were accustomed to live in the open air, the climate of Greece and of southern Italy not requiring habitual precautions against cold.

But if one cannot affirm that the Greeks and Romans in antiquity employed colored glass in windows, it may be admitted t that Aryans possessed this mode of translucent decoration from a remote epoch. To be dated from the relations of Rome with A Asia in the introduction into Italy of mosaics composed of cubes of colored glass pastes. When the empire was established at Byzantium, from the Orient came those vases of colored glass so greatly prized in the West from the 7 th century. Things change little in the East, and the lattices of stucco or marble enclosing bits of glass of different colors, that we see in monuments of the 13 th and 14 th centuries in Asia and even in Egypt, m must be a very ancient tradition, whose origin appears to be in Persia.

Whatever may have been those origins more or less distant, colored glass in abundance was made in the West from the 12 th century, and the monk Theophilus belonging to that epoch presents the means of manufacturing these objects as being no novelty. On the contrary his text indicates long practice in that kind of translucent painting, and the stained glass windows that we still possess, dating from that century, are so perfect in execution, that one must assume a long experience for obtaining that development of an industry, whose processes are tolerably complicated.

It is singular, will be objected, that there remains not a single panel of authentic colored glass from before the 12 th century, while we still possess objects much preceding that epoch. But when one knows with what facility we allow things to perish, that are no longer in fashion, and how easily glass is destroyed as soon as removed from its place, this objection loses much of its value.

Of all the stained glass transferred during the French revolution to the museum of French monuments, what remains? A dozen panels at S. Denis, some at Ecouen and Chantilly, and those are al

Note 1.p.374. Knowing that much of this stained glass was tr transferred to the storehouses of S. Denis after the dispersion of the museum of Petit Augustins, when we were charged with the restoration of the abbey church, we inquired where this gl glass was placed. We were shown three or four boxes containing thousands of bits of glass piled therein. Scarcely three pieces remained joined by leads. The boxes are still awaiting the fairy willing to unravel that chaos.

It is then necessary for us to take up the art of the glass worker at the time that the monuments appeared, i.e., about 1100; and it may be said that the monuments of the 12 th century are the most remarkable, if this art can be considered from the decorative point of view.

The book of the monk Theophilus is the most ancient written document on the manufacture of stained glass, that we possess, and this cleric lived in the second half of the 12 th century;[1] at least the recipes given by him and the taste in ornamentation prescribed by him appear to indicate that date.

Note 1.p.375. Diversorum artium schedula.

Theophilus wrote his book as a practician, not as a theorist; thus it now has a serious interest for us, the more that the p processes indicated by him exaclty agree with the monuments r remaining to us from that epoch. Thus it is necessary to analyze those documents. He commences [2] by giving the method of designing the glass.

Note 2.p.375. Book II, Chap. 17.

"First," says he, "make a flat table of wood of such width and length, that you can draw on it two panels of each window." This table is covered by a coat of whiting mixed with water a and rubbed with a cloth. After this preparation dries thoroughly, the artist draws on it the subjects or ornaments with a l lead or tin point; they when the drawing is completed, he traces an outline in red or black with a brush. Between these lines t the color of each piece is indicated by a sign or letter.

Pieces of suitable glass are successively placed on the table, and the principal lines, those of the leads are traced on the glass, which is then cut by means of a hot iron and a flat piece of steel with slotted edge.[3]

Note 3.p.375. The diamond now replaces the hot iron with advantage.

Theophilus does not clearly state whether he indicates on the table (that we now call the cartoon) the complete modeling or the figures or ornaments. He speaks only of the drawing; yet when he takes up the painting, i.e., producing the modeling on the cut pieces of glass, he says that it is necessary to follow accurately the lines on the cartoon. This passage naturally explains itself, if one examines how the stained glass of the 12 th century is painted.

On these pieces of glass the modeling is nothing but a series of lines in the sense of the form.

We shall soon return to this important point of the art of t the glass painter.

Theophilus [4] indicates the recepe for producing grisaille, (gray glass), the modeling, the drawing repeated on the glass. All who have closely examined stained glass made during the 12 th and 13 th centuries know that the glass employed is colored in the paste, and that the modeling is only obtained by means of black or brownish-black painting applied to this glass with a brush and vitrified by fire. This is the black color mentioned by Theophilus in his Chapter 19. He there composes if of t thin copper burned in an iron vessel, green glass and of Greek sapphire. Was this a natural or artificial substance, a flux or an oxide? There is every reason to believe, that Greek sapphire was a bluish glass from the Venetian shops, tha had a fluxing property. Indeed the Venetian glass possessed that quality in a degree much superior to our ancient glass. These three substances are ground on a slab op porphyry, mixed in equal parts; i.e., one third copper, one third Greek sapphire, one third green glass, and diluted with wine or urine. This color is placed in a pot and applied with a brush, either light, darker, or thick, to make black and fine lines; or indeed it is spread on the glass in a thin coat and then removed with a wooden point to form very fine ornaments, or touches detached in light on a dark ground, yet still translucent.

Note 4.p.375. Book I, Chap. 19.

The glass being thus prepared is placed in the oven to vitrify this monochrome painting. According to Theophilus, it will be by the aid of copper oxide that this brown color will be o obtained. Yet the pieces of painted glass of the 12 th and 13 th centuries, that we could have analyzed, have only given o

iron oxides for that vitrified brownish-black color, and it is still the iron protoxide that is employed today for that purpose. [1] Further, a calcined copper protoxide gives a brown powder, that placed in the oven with a flux produces an effect similar to that presented by the iron protoxide, but with a greenish tinge.

Note 1.p.376. M. Oudinot, a glass painter, on his part has had analyzed fragments of the painted glass of the 12 th and 13 th centuries; the analysis has likewise only given iron protoxide. Today this painting is obtained by means of iron scales collected in blacksmith shops, sifted to separate particles of metal and pulverized with a flux. Also formerly and now again is employed an iron mineral called red hematite, a natural iron oxide browner than red. This substance gives to grisaille a warmer tone than the iron scales from blacksmith shops.

An important question in the manufacture of the glass, besides those concerning the artist, is the mode of obtaining the sheets of glass. In the 12 th century, according to Theophilus, the sheets of glass were made by means of two processes no longer employed in our days.

With the ponty the workman gathered in the crucible a mass of incandescent glass; he blew so as to produce a bottle of elongated form. Bringing the end of this vessel near the flame in the furnace, this end melted and opened. With a piece of wood the workman dilated the opening till it equaled the largest diameter of the vessel.

Then by bringing together the opposite sides of this end, he formed a figure of eight (Fig. 0). When so prepared, this glass was detached from the ponty by rubbing a piece of wet wood on the neck of the bottle. Heating the end of the ponty in the furnace with the bits of incandescent glass still on it, he attached the end of the ponty at the middle of the figure of eight. The upper end of the bottle was then presented to the flame; then the opening was enlarged as before. The piece of glass being so arranged, it was detached from the ponty and carried to the cooling oven. This glass with the form given in Fig. 0 was brought again to the fire to be dilated, split open and flattened. [1] The process of making glass in disks was also employed, more rapid and simpler. The workman blew a vessel; he presented the bottom to the flame, as stated above; then dilating that e

and he rotated the ponty very rapidly; the dilated edges of the glass by centrifugal force tended to pass out from the centre, and thus was obtained a disk with concentril striations, thicker at the centre than at the edges. The glass thus flattened by either the first or the second method was first colored in the crucible by means of metallic oxides. Theophilus does not mention flashed glass[1] and indeed the stained glass of the 12 th and 13 th centuries do not show it, excepting for red. Still may be seen pieces of a beautiful orange red from the 12 th century, that are tented in the mass, [2] or at least for about half their thickness. This manufacture of red must be an antique tradition.

Note 1.p.377. See Theophilus, Book II, Chaps. 8 and 9.

Note 2.p.377. At Venice is now made red glass of a very soft tint in the mass. This glass strongly recalls certain specimens from the 12 th century.

Indeed the glass cubes composing the mosaics of the interior of the church S. Sophia of Constantinople are generally of a beautiful ward red, on which the gold leaf is applied, translucent with strata of a dark opaque tone. The translucent red strata are 0.12 or 0.16 in. thick and give a beautiful coloring, which recalls that of certain red glass of the 12 th century. But after that epoch red glass was obtained by a different process. The workman had two crucibles filled with greenish-white glass in the furnace. Into one of the two were cast scrapings or particles of copper and it was stirred; the blower gathered a ball of white glass in one crucible, and at once plunged it in the second crucible holding the particles of copper in suspension. He regulated the coating on a hot stone, blew and worked it as stated above. Thus was obtained flashed glass in which at most half the thickness shows the red coloring as if spread on. If one of these pieces of glass is broken, the red color shows itself by strata irregularly scattered in that flashing on greenish-white glass, as indicated by the section (Fig. 1). This process of coloring by overlapping irregular strata gives to a red tone a veined and glittering appearance of great strength. One will indeed understand, that the light passing through the glass and striking the strata of red imbedded in the paste and both reflecting, must produce a coloring of unequaled intensity and transparency. Each stratum of red paste produces the effect

effect of a spangle, and one sees at the same time a translucent red coloring and a red gleam reflected from the neighboring strata. Later and from the middle of the 14 th century, red glass is obtained by an extremely thin flashing on a greenish white glass; the red is no longer imbedded in the paste, but laid on it in making the disk.

Thus this red glass gives a more uniform coloring, and vieved near is more powerful than that of the glass of the 12 th and 13 th centuries; but at a distance, the gleam of this flashed glass is less luminous and refined; it is often heavy and crushing in the entirety; in brief, the decorative effect is not so good. Yet the operation of flashing the disks still gives certain irregularities, stries more or less colored, that retain a certain transparency of tone. Today the flashed red glass is perfectly uniform in tone, and if glass painters employ it and desire to obtain a fine coloring at a distance, they are obliged to vein it by artificial means. In the 12 th century, they did not have yellow obtained with silver salts; yellows were smoked white glass, produced by chance, as Theophilus indicates. [1]

Note 1.p.373. Book II, Chap. 7.

Yellows from silver salts only date from the 14 th century; they are only applied on white glass.

From the ornamental point of view, glass in disks or roughly extended presents an advantage. Since this glass was tinted in the mass, at least during the 12 th and 13 th centuries (excepting red), differences in the thickness of the sheet of glass caused variations of tones to appear, that the artist glaziers utilized with much skill by cutting the glass so that the thinnest portion came beside the white. Even for uniform grounds, these differences in thickness gave a gleaming appearance to all coloring, which at a distance singularly increased the intensity of the tones. All colorists know that to give a tone all the value that it should have, it is necessary to present it to the eye only in bits, by gleams, if this may be said. The Venetians and Flemings knew that law well, and to convince one of it, it suffices to observe their paintings.

What is true for a painting applied to a panel or a wall is even more rigorous for a translucent painting. In stained glass, the colors affect the light passing through it and have such a

gleam, that the smallest colored bit assumes a distance by radiation a prodigious importance. But it must be said, that the radiations of translucent colors have very different values. Thus only taking the three fundamental colors, those of the p prism, blue, yellow and red, these three colors applied to glass and therefore translucent radiate more or less. Blue is the c color that radiates most, red radiates badly, yellow not at all if it approaches orange, a little if it is straw colored.

Thus assuming a design for glass composed as in Fig. 2. The black lines indicate the leads (see A). The compartments R are red, those marked L are blue, and the strips C are white. Observe the effect produced at a distance of about 66 ft.(See B).

The circular spaces L in blue radiate to the dotted circle, and the red will only remain full in the middle of each area R. It results from this, that all surfaces O will be red tinged with blue, i.e., violet; that the isolating whites between the tones having no colored radiation, will be slightly tinged with blue at v, as well as the leads themselves; that the general effect of this stained glass will be cold and purplish on the greatest part of the surface, with red spots r, discordant if you are not very far from the glass, dark if you are far distant from it. But if (see A) we diminish the areas of the blue disks by black painting as shown at D, we partly neutralize the radiating effect of these disks. If instead of the white strips C we place strips of yellowish or greenish white, and if we trace lines or pearls on these strips as marked at f, we then obtain a much better effect. The blues being thus strongly enclosed by black lines outside and inside, lose their radiating power. The reds are much less violet in their vicinity. The yellowish or greenish white tones of the strips acquire delicacy by the bluish tinge affecting their ends, but leaving between those ends a warm portion allied to the red, especially if we have taken care to increase the value of the leads by these round spots or by simple inside lines.

On the contrary, let us assume the squares R (see A) to be blue and the disks L red. At a distance the strong radiation of those large blue surfaces in comparison to the red spots will be such, that these red spots will appear black or dark violet, and that one cannot suspect the presence of red. The white strips will appear a dirty gray, or green if they are yellow, or

bluish green if they are greenish white. The effect will be bad and without contrasts. The radiation of the blue will weaken a and dirty the other tones, and these will no longer have the power to give the blue its delicacy and transparency. The general coloring will be cold, tinged with lake anf of a flase tonality; for in stained glass even more than in painting, each tone acquires value only by the contrast of anothe! tone. A li light blue near a yellowish green becomes turquoise: the same blue near a red becomes bluer. A red near a straw yellow has an orange tint, while it will be tinged violet near blue.

These elementary principles and others, that we shall have occasion to develop, were employed in practice by the glass p painters of the 12 th century with a certainty and experience, such that it is indeed necessary to admit for those artists a long series of observations. We do not think that they have established a written theory of those relations of the translucent colors, a sort of scientific treatise, as one might do in our time; they proceeded by the experimental method, and the traditions acquired were perpetuated in the atelier.

As for the style of drawing applicable to painting on glass and as for harmony of the simultaneous effect of translucent colors, the 12 th century has an incontestable superiority over the 13 th. Then in the 12 th centurn, the design proceeds after the Greco-Byzantine method; the nude imposes the form, the clothing only encloses it, nothing is left to chance; the entirety and the details are conceived and executed according to principles based on profound observation; while only later one often finds in the midst of beautiful works negligence and forgetfulness of those principles.

The glass employed by the artists of the 12 th century may be classified thus:--

Blues.	1. Clear blue, slightly tinged with turquoise.
	2. Sapphire blue, but greenish.
	3. Indigo blue, intense.
	4. Azure blue, very light, linen gray.
Yellows.	1. Straw yellow, smoky.
	2. Saffron yellow or bistre.
Reds.	1. Red not flashed, very soft and uniform tone.
	2. Intense red, striated.
	3. Light red, smoky.

Greens.	1. Yellowish green, clear.
	2. Emerald green. This tone in the hand seems to approach gray rather than green; it assumes its brilliancy at a distance, especially by contrast of b blue and red tones.
	3. Bottle green. In the hand, this green appears cold; it assumes its quality like the last.
Purples.	1. Light purple, warm.
	2. Clear purple, bluish.
	3. Dark purple, like wine.
	4. Very light purple, smoky for flesh.
Rare tones.	1. Reddish brown, color of Spanish wine.
	2. Dark green, warm.
Whites.	1. Yellowish white, smoky.
	2. Grayish white, bluish.
	3. Pearly white. [1]

Note 1.p.381. The blue glass of the 12 th century possesses a particular qualityl that causes it to be recognized among all those of other epochs; this is that it appears blue in the light of a lamp, while those of later epochs pass into a laky gray, green or violet. This observation was suggested to us by glass painters, skilful practicians, and experience has confirmed it.

All these chemical operations of the glass,painters of the m middle ages being empirical, the account of the unexpected and of variations was long. Theophilus allows us to understand that chance alone gave certain tones, by which the artist knew how to profit. The palette of the glass painter was then very extensive, and it is necessary to take the classification here given as not absolute. We have only indicated the values; but as for tonality, these values present numerous varieties. The talent of the glass painters particularly consisted in never placing two equal colors beside each other, and in profiting by the varied tones with the real feeling of a colorist.

We have already stated, that all these tones excepting red, are miked in the mass of the glass and not flashed, ar they were made later.

This palette being composed, the glass painters proceeded as indicated by the monk Theophilus. They traced on a cartoon the principal lines of the figures and ornaments; or rather the l leads were only the accurate design of all parts. In composing

his cartoon, the artist thought of the setting in leads; that is clearly evident by the careful examination of the stained glass of the 12 th century, since the outlines are always accented by leads, which then form the general drawing. On these cartoons did the artists paint all the shadows, half tints and internal lines? We do not believe this for two reasons; the first being that it sometimes occurs that pieces of glass have only been cut, and that by lack of time or forgetfulness, they have not been finished by painting; the second is that sometimes the same cartoon has also served for two figures, for example as pendants, when the internal modeling differs in the two figures. There is every reason for admitting that the master traced the outline on the cartoon with some internal chief lines; that the workmen cut the glass on this cartoon, tracing the principal lines as joinings, and that the glass was temporarily assembled on the frame in light from below, and was painted by inspiration without recourse to an opaque cartoon modeled in advance.

Fig. 3 [1] will illustrate this mode of procedure. At A we have drawn the cartoon prepared by the master; at B is the modeling on the same glass, when it has been cut and temporarily assembled on the frame before upward light. It is conceivable that with such an accurate drawing showing the leads, it was scarcely necessary to indicate on the cartoon all the modeling. The dotted lines on Fig. A give the joining leads, that cross the contours. To avoid too large pieces of glass, the master has drawn the band a on the mantle, which is of a different color, and that the leads frankly outline.

Note 1.p.382. From a stained glass window of the cathedral of Mons, beginning of 12 th century, representing the Ascension.

It was necessary that the painters entrusted with placing of the grisaille or the modeling on the pieces of glass, cut according to the cartoon, could draw. It is true that then in the West as in the Byzantine schools, there were actual procedures for painting a head or a vestment; [2] and those procedures were really based on long and profound observation of the decorative effects. Thus when the master had drawn the cartoon (and the style belonged to him), it sufficed to find skilful workmen sufficiently imbued with the traditional procedures to paint in the cut glass the proper modeling. We do not understand the art of painting in that manner today, and it is unnecessary to regret

this, if it concerns paintings to be placed outside in a general ornamental effect, like objects possessing their special qualities independent of an entirety. But if the painting participates in an entirety, if it enters into the general harmony, that every edifice should present to the eyes, it is necessarily subject to purely physical laws, that one cannot disregard, and which are superior of talent or the genius of the artist. Indeed the genius of a master cannot modify the laws of light, of perspective or of optics. We know well that a very great number of artists of our time are endowed with a temperament too spirited or independent to submit to any laws not dictated by their caprice; but we know with no less certainty, that light, optics and perspective have not yet changed the laws governing them to suit those unruly minds. If light, optics and perspective are physical combinations of a different age, if they reigned in barbaric times, they still reign at all times, and t they do not yet appear disposed to abdicate, nor even to grow old. Now on the contrary, the artists that composed the stained glass windows of the 12 th and 13 th centuries manifested their absolute submission to those laws, and applied them with as m much intelligence as modesty. That submission gives us an instruction by which we rarely profit, but still is no less good and worth the trouble of examination.

Note 2.p.382. See Manuel d'Iconographie Chretienne, Grecque et Latine, with an introduction by M. Didron, translated from the Byzantine manuscript by Dr. Paul Durand. Paris. 1845.

No one is ignorant of the attempts made for thirty years to give to painting on glass new brilliancy. Our most skilful glass painters have sometimes made excellent imitations; they have completed ancient stained glass with perfect imitation, such that one cannot distinguish the restoration from the old parts. Thus they have acquired ample knowledge of the procedures, not only of the material manufacture, but of art applied to this kind of paintings. [1] They have been able to recognize the remarkable qualities of the ancient stained glass in decorative effect and harmony, and the perfection of certain processes in execution, attained with difficulty, of material skill of the workmen, and to appreciate the style of the masters, so very appropriate to the object. This art of the glass painter is therefore not a mystery nor a lost secret.

Note 1.p.384.There may be cited as remarkable among those f facsimiles ; the panels of the restorations in S. Chapelle, due to MM. Lusson and Steinheil; those of the windows of the 12 th centuryin the abbey of S. Denis, due to M. Gerente; the restorations of the stained glass of Bourges and of Mons made by M. Coffetier.

What has been forgotten for several centuries is the only t true means appropriate for painting on glass, a means indicated by observation of the effects of light and of optics; means per-perfectly understood and applied by the glass painters of the 12 th and 13 th centuries, neglected from the 15 th and disdained since, as we have already stated, in spite of those unchangeable laws imposed by light and by optics. To desire to reproduce what is called a picture, i.e., a painting in which one seeks to render the effects of linear perspective and of aerial perspective, of light and shadow with all their transitions, on a panel of translucent glass, is an undertaking as r rash as to pretend to render the effects of human voices with stringed instruments. A different procedure, other conditions, another branch of art. There is almost as great a difference from the picture, opaque painting, seeking to produce the illusion, and painting on glass, as between the same opaque picture and a relief. The relief may be painted, yet it can never produce the effect of an opaque picture on a wall or a canvas; this illuminated relief will only be an assemblage of figures on a single plane. In an opaque picture, a painting, the radiation of colorsis absolutely subject to the painter, who by half tints, shadows varying in intensity and value according to the planes, can diminish or increase it at his will. The radiation of translucent colors in stained glass cannot be modified by the artist; all his talent consists in profiting by it according to a harmonci principle in a single plane, like a rug, but not according to an effect of arerial perspective. Whatever one does, stained glass never represents and cannot represent more than a plane surface, it even has its real qualities only on that condition; every attempt made to present several planes to the eye destroys the harmony of color without producing the i illusion in the observer; while an opaque painting has and must have the effect of causing the eye to penetrate into a series of planes, of presenting a succession of solids. If there be but one figure in a painting and that figure be placed on a solid

background, the painter assumes to give the figure the appearance of a body with thickness. If the painter does not attain this result in his first attempts, it is no less certain that this is the aim to which he tends, just as much in [illegible]quity as in modern times. To transpose this quality of opaque painting into the art of translucent painting is then a false idea. Translucent painting can only propose as its aim, that the design may be based as strongly as possible on a harmony of colors, and the result be satisfactory as such. To desire to introduce qualities suited to opaque painting into translucent painting is to lose the precious qualities of translucent painting without possible compensation. This is not here a question of routine or of blind love for an art, that one desires to m maintain in its archaism, as sometimes pretended; it is one of those absolute questions, because (we cannot repeat too frequently) they are solved by physical laws, in which we can change nothing. You can never sing to a guitar like Rubini, and if some persons take pleasure in hearing the overture of William Tell played on the flageolet, that would not be to the taste of musical amateurs.

We believe this discussion to be in place here, because we have heard many times repeated:- "What if the stained glass of the 12 th and 13 th centuries is beautiful, this is no reason for reproducing eternally the best types that they have l left us; it is necessary to take into account the progress m made in the domain of the arts; those archaic figures are no longer to our taste, etc." certainly it is not at all necessary to copy forever those types of the fine epoch of painting on glass, in brief making imitations; but what should not be lost from view are the procedures of art, so skilfully applied then to painting; what is necessary to avoid (because it is n not an advance but indeed a decadence) is that transposition of one form of art into another opposed to it. With more persistence than good faith, men often affect to rank us among t the fanatics of the past, because we say:- "Profit by what is done; do better if you can, but do not ignore the route already traversed, the results already obtained in the domain of the arts. Now what you frequently give us as an inspiration full of promise, is only a forgetting of long and useful labors, an incoherent assemblage of badly understood forms, or procedures

wrongly applied."

The stained glass of the 12 th century, like that of the 13 th, is held in place by leads, that enclose each piece of glass and form the panels; strips or points keep these panels in their places, and prevent them from bending under their own weight. These panels are set in iron frames (see Art. Armature).

It is clear that these panels cannot exceed certain dimensions, since they must resist the pressure of the wind. The setting in leads leaves an elasticity very necessary for the preservation of these panels. The glazier must take into account these material elements of the work. These conditions are no less imperative than those imposed by light and optics. They a are conditions of stability, of durability, and which thereby must influence the conception of the artist and be utilized by him, if he is skilful. The iron frames outline the great ornamental divisions and give the scale of the object, a matter more useful than generally thought. The leads accent the design and separate the colors by a strong line, a condition necessary f for the harmonious effect of the translucent tones. There remains the internal modeling. That is where the glass painters of the 12 th century in particular have shown their profound observation of the effects of translucent painting. Those artists knew:-- 1, that the tones have only a relative value; 2, that the radiation (halation) of certain translucent colors is such, that it changes or modifies even the quality of those colors; 3, that the modeling applied on the glass in even the darkest parts must allow the local tone to appear, not through a glacing but in pure spots; for a shadow covering a colored glass gives at a distance an opaque tone, that does not p participate in the color of the glass it covers, but in the r radiation of the adjacent colors, by reason of the radiating effect of those colors. Thus to make our explanation clear; a assume (Fig. 4 7) a disk A of red glass surrounded by blue glass; if we have placed a shadow around this disk (itself translucent like a slightly opaque glaze), this shadow will participate, not in the local red tone of the glass, but in the blue radiation of the surrounding glass. This shadow will therefore take a false and dirty tone, a mixture of brown and blue, that will cause the blue to appear hollow and without solidity, and the red tone discordant. On the contrary (Fig. 4 B), if we have

taken care to place that shadow on the disk, not flat but hatched and leaving a red ring all around it, this ring and the intervals left in the hatching will give a red ground to the shading, and the blue will retain its quality. The ring and the intervals of the hatching will assume sufficient value because of the contrast of the black lines, to contest the radiation of the blue tone and to leave to the shading of the disk its red ground.

Let us see the application of this formula. Here (Fig. 5) is a fragment of the beautiful stained glass of the cathedral of Chartres, [1] which represents the tree of Jesse. This glass dates from the middle of the 12 th century. [2] The ground is blue, that clear blue slightly tinged with green, that belongs to the manufactures of that epoch, and that recalls the color of certain autumn skies, between the ornage band of the setting sun and the purple near the zenith. The robe of the king is of a vinous red, a warm purple; the mantle emerald green, the pallium and crown are smoky yellow, the shoes and the surfaces of the sleeves are red. It i evident that the modeling painted on these vestments is only composed of a series of hatchings, allowing the local tone to pass between them, particularly near the borders; so that the radiation of the blue glass ground is neutralized by these spots of the local tones of the vestments passing through the crevices of the hatching. These observations seem to partly contradict the demonstration accompanying Fig. 2, but are merely a corollary of it. In Fig. 2 we have seen that to neutralize the effect of the radiation of the blue tones on the red tones, we have diminished the area of these blue tones by opaque painting, a sort of perforated screen, that subjects their contour to indented forms. Now at a distance, when the translucent colors are very radiating, that p property of these colors is much reduced by the aid of the perforated screens; but by the effect of that radiating property, the perforated screens appear diffused, and the crevices left pure simply lose their relative coloring value. The contrary effect is produced for colors with feeble radiation, their color intensity increasing by reason of the small surface left p pure in the crevices of a screen. For example (Fig. 6 7), take a blue glass A, whose radiating surface has been diminished by the opaque painting of screen B. At a distance this blue will

produce the effect indicated at C. The farther it is distant, the screen painting is the more confused, but also the blue will tend more to gray. Let a red glass be painted in the same manner; the more distant it is, the more the screen painting appears enlarged by losing a little of its opaque quality; if at a great distence,the red will only be seen in narrow lines as represeted at E; but these lines will gain in intensity of color what they lose in extent. We admit that the red glass is streaked; if it were uniform, it would appear at a distance like wine or chestnut. According to this principle, each translucent color must then receive the screen painting according to its radiating property. The glass painters of the 12 th century prove by the works they have left us, that they had a perfect knowledge of these laws, and we confess for ourselves, that we know these only by careful study of those works. Whether they arrived at these results by prolonged empiricism or by wise observations collected in the Orient, tha is really of very little importance to us; the fact is a reason for their methods. For all stained glass known, that of the 12 th century alone possesses this clear and assured harmony, that one cannot weary of admiring; such a frank harmony, that at a great distance and without needing to examine the style of the designs, one of those stained glass works is recognized in the midst of many others. [1] Knowing then the more or less radiating properties of colored glass, the glass painters of the 12 th century have placed and painted this stained glass in accordance with these properties, and also with the influence these translucent colors exert on each other.

Note 1.p.387. Western facade. This drawing is 1 : 8.

Note 2.p.387. See Art. cathedrale.

Note 1.p.390. Among others, see the western stained glass w windows of Notre Dame of Chartres; those of the abbey church S. Denis, executed under abbot Suger; some stained glass windows of Mans, Vendome and Angers.

For example, knowing that the clear blue recently mentioned possesses a radiating quality above all other colors, they employed it in large areas only in grounds; and to prevent the r radiation of those blue surfaces from injuriously affecting the adjacen tones (all radiating less in different degrees), they have charged these with lines, hatchings, opaque details like

screens, so as to give these tones a greater intensity by virtue of the law explained in Fig. 6; but further (always by virtue of this law and that also explained in Fig. 4), they carefully avoided making these tones dirty by solid shadows, even if translucent, and they have always allowed spots of the local tone to pierce through the network of the heaviest shadows. Th These artists have also used pearly white glass as an indispensable aid for giving the colors their relative proportions. T Thus in the example given (Fig. 5), the branches of the tree of Jese, some leaves of the bouquets, are cut from white glass; but these luminous parts are charged with painted details, that lessen the brilliancy and the hardness. 2

Note 2.p.390. For the general coloring of this stained glass, see Monographie de Notre Dame de Chartres, by M. J.B. Lassus. This stained glass is very faithfully copied by M. P. Durand. The accuracy of the drawing and of the modeling could not be more complete, but the coloring given by chromolithography cannot render the effect of the relations of translucent colors. Thus the blues are heavy and dark, the greens hard, etc.

The blue ground surrounding the tree, the principal subject, and which occupies the entire middle of the window, is opposed by two wide borders, whose arrangement is given here (Fig. 7); for it is by the entirety as much as by the details, that this composition is commended. At A prevails the blue ground from which is vigorously detached the tones of the personages and in light the branches of the tree. At B are the prophets on a red ground. Those prophets are chiefly clothed in blue and smoky yellow, and they hold white scrolls. This warm tonality (for the blue here is no longer the same as that of the ground, but more intense or more green) gives a luminous transparency to t the blue ground of the centre. To connect these red grounds of the prophets, the artist has draped in a red mantle the Jesse lying at C; he reposes on a bed hung with white, that serves as a point of departure, a base for the tonality of the tree. A dark blue robe that covers the upper part of the body of Jesse, this white and some yellow fringes, give incomparable brilliancy to the red of the mantle. The red semicircles serving as background for the prophets are enclosed by a blue band in the tone of the ground A, and by a white border charged with details; then the spandrels G are on a ground of beautiful emerald

green, warm and clear. Around is developed a border, splendid in composition and brilliancy, that he give in detail at one-sixth full size (Fig. 8). At A are the red grounds of the prophets; at B is the blue band that recalls the tone of the ground of the Jesse, then the wavy white stripe scratched in with a poin on a bistre tone applied on the glass; at C is the green ground of the spandrels. These are charged with a blue square painted with bistre, extremely delicate details being scratched in with a point, according to the method indicated bn Theophilus. These blue squares are intersected by ornaments of warm purple, that are vivid on the green ground. A white border, also covered with bistre and scratched, encloses the blue square. The red appears anew at R. A beaded yellow forms the inne line of the border; it is doubled by a blue strip F of the same tone as the ground of the Jesse. Red reappears at G, and the blue of the ground of the Jesse at L. For the interlacing beabed bands, this is done on white glass. The circles and lance leaves are smoky yellow; the leaves are green and purple; the outer beaded strip is a doubtful yellow. In this stained glass, there are only these tones of glass.

1. pearly white; smoky white.
2. Clear blue.
3. Intense [illegible] y indigo.
4. Emerald green.
5. Green approaching a turquoise tone.
6. Warm purple.
7. Red.
8. Yellow; two tones.
9. Flesh tones are light and smoky purples.

According to what Theophilus said, it was easy for the master to indicate colors on his cartoon by letters, and to establish harmonious relations with more certainty, than he could have done in experimenting with a palette of tones. The blue tone of the principal subject dominated the entire tonality if the rest. It was necessary to allow the luminous splendor to gleam in this centre. This principle determined the red grounds of the prophets, the recall of the blue of the principal ground in the semicircular bands. To give value, both to the vigor of the red coloring and to the radiating transparency of the blue, emerald green grounds were placed in the spandrels. Then the blue ground

was recalled , but giving it a solid value by adding that delicate ornamentation of the squares. Finally, the border summarizes all the tones scattered in the principal subjects, but in small pieces; so that this border with a solid and strong effect still does not rival the broad arrangement of the central parts. These white beaded interlacings are a brilliant border for the principal paintings; a border connected to the subjects by the blue squares delicately lined and enclosed by white strips.

If we now examine the details of this border (Fig. 8), we observe that the purple, green and yellow leaves, detached from the blue ground L, are modeled according to the method indicated by Fig. 4, i.e., that this modeling always allows to be seen pure spots of glass between the hatchings, and notably on the borders of the ornament, so as to oppose the radiation of the blue ground, that further is visible only in pieces relatively small.

It is too easily believed that the old paintings on glass partly owed their harmony to the stains deposited by time on their surfaces; we have frequently heard glass painters even pretend, that this stained glass of the 12 th and 13 th centuries must have produced a discordant effect when new. This opinion might be sustained in regard to certain trade stained glass, such as made in all ages, and especially in the 13 th century; it appears to us erroneous to apply it to the glass of the 12 th century, that we unfortunately still possess in too little quantity, and to the good glass of the 13 th. Examining Figs. 3, 5 and 8, it is easy to see that the painters perfectly avoided discordant effects by the multiplicity and the arrangement of lines or hatchings composing the modeling. By leaving the grounds clear, and selecting for these grounds frank tones, but of a beautiful coloring quality and luminous, they took care to place on all the tones forming the composition, figures and ornaments by a close modeling or delicate details, that give to these tones the proper relative values. M Men customarily replace now this delicate work, so well arranged to make avail the quality of each tone, by an artificial s staining applied to as to allow to appear spots of pure tone, and thus sometimes harmony is cheaply obtained. But it must be confessed, that this procedure is barbarous, and permits the

supposition that our glass painters have no very clear theory of the conditions of the harmony of stained glass. This is nearly as if to conceal the discord between instrumentalists executing a symphony, a continuous bass is made to dominate from beginning to end, a sort of neutral roaring with some rare intervals allowing the hearing of one or two bars without this monotone a companient. To execute a painting, particularly if translucent, i.e., of unrivaled brilliancy, to stain it under pretext of harmonizing it, is an idea that might enter the heads of amateurs, passionately fond of the patina of art objects rather than of those objects themselves, but unable to come to the artist mind, that seeks by all sincere and profoundly studied means to render its conceptions. It is always evident that already in the 13 th century, men placed certain glazes on parts of the common glass; [1] but these light glazes applied cold, and probably to the glass set in place, were expedients for obtaining a general effect, and not a staining placed by chance on the panel.

Note 1.p.394. We have recognized the existence of these artificial stainings on stained glass enclosed in plaster of paris soon after their execution.

The stained glass from the 12 th century in the cathedrals of Chartres and of Mans, the abbey church of S. Denis, of Vendome and of Angers, could and may dispense with that patina, since (excepting the grounds, that we should not forget are made of glass of a quality incomparably harmonious) all the details of ornamentation and the figures are covered with the work of the brush. Thus for artistic glass painters, two distinct operations were proper for obtaining the general harmony of stained glass, when the cartoon was drawn: 1, the marking of the tones of the gla s on this cartoon; 2, the work of the brush on this glass, which completed the harmony by giving each tone the proper relative importance.

The method adopted by the artists of the 12 th century for the first part of this work is given by Theophilus; it was by means of letters that the master indicated the colors on the cartoon.

Now this method must approximate that which we are to indicate, based on examples of stained glass of that epoch. Assuming the five vowels to signify:--

A = white.
E = dark purple.
I = light purple. Compound colors.
O = emerald green.
U = bluish green turquoise.

The consonants signify:-

B = blue.
J = yellow. Simple colors. [1]
R = red.

Note 1.p.395. The glass painters employed several values of each tone, as we have indicated above. It was easy to distinguish each value by a sign; thus the B (blue) could be B 1, B 2 or B 3, so indicating clear, light, turquoise blue, the sapphire blue, indigo blue, etc.

We start from this primary law; that every simple color dominating in a subject, for example forming the ground, it is necessary to employ with it a majority of compound colors; that if with this simple color of the ground other simple colors are used, it is necessary, either that these colors be in small p pieces, or be isolated by an important addition of white. Example; in Fig. 5 of the tree of Jesse of Chartres (first king) t the ground being B, the vowels must dominate in the composition. Indeed the artist has used; mantle, O; robe, I; branches, A; f flowers, E, U, I, O. The consonants appear only in small parts; crown, pallium, [illegible]. In the upper bouquets, central leaf in the lower bouquets, J; clast, ruffles and shoes of the king, R. If we take the other kings above the first and the Virgin at the top, the law is the same, i.e., the ground being the consonant B, the vowels compose the figures and ornaments. At the bottom, Jesse is covered by an ample red mantle, for a reason in harmony indicated above, but this mantle is entirely surrounded by the letter A, i.e., by white. The same rule for the border; the ground of the bouquets is B, the bouquets are I, O; the central lancet and the round are J; but the central lancet is very thin and is connected with white, like the round. Yet the grounds of the prophets are R, and B enters strongly into the vestments of these prophets, as well as J; but this is one of those procedures in harmony common in that epoch, and w which confirm the rule given above. First B or blue is employed in most of the vestments, either greenish or an azure light

blue, which is no longer a simple color; J is either straw or very smoky. There is here a special case, the harmonic principle of the artist was this; to obtain a brilliant centre, clear and light, soft to the eye. To attain this result, it was essential to have around this central portion a vigorous coloring, even a little hard, a sort of repelling dissonance. Hence these combinations of red and blue. But if one examines this beautiful stained glass, with what art of the colorist is this effect obtained! In those blue vestments of the prophets run purple bands; then on the adjacent parts are azure blue and very luminous tones of emerald green; long white scrolls and even white robes destroy what would have been too forced in the tones of these two borders of the prophets. The strength of the ground of emerald green in the spandrels, separated from the red ground of the phopnets by a strip of white and a strip of pure B, that is the B of the ground of the kings, adds also to the solid effect of the tonality, and this emerald green is m made refined and soft by the wide purple leaves, that intersect it, and which come from the lined blue squares (Fig. 8).

The glass painters of the 12 th century sometimes employed green grounds, but only for accessory parts, ornaments, and to cause these grounds to participate in a system of borders in the style of that just described. Further! for the subjects during the 12 th and 13 th centuries blue and red grounds are alone employed, i.e., simple and strong colors, and this is understood. From the instant, when the glass painters recognized that with a dominant color as a ground, there were no longer but exceptionally required colors of the same order, i.e., that with a consonant dominant color (to return to our theory), it was only necessary to use vowel colors, and vice versa, being forced to take for grounds the simple colors; for assuming that one had taken as ground a purple color (a compound color), for example, the objects in that ground could only be blue, red and yellow (simple colors). That diminished the resources of the palette of the glass painter to three colors and white for all vestments, nudes and ornaments of the subject, which presented a monotonous and restricted harmony. In adopting blue and red grounds, particularly blue, the glass painter had for coloring the subjects and ornaments, two greens, two purples, linen gray blue and turquoise blue, i.e., six colors, without counting wh-

white and the broken whites. Besides, with the blue ground and by means of the same artifices, he could still employ red and yellow, and with the red ground, blue and yellow. There is again another consideration; blue and red alone as ground tones may pass without painting, without appearing hollow. Yellow is too absorbent, not by its radiation, since it has none, but by its brightness; as for mixed and broken tones, if they are not charged with painting, i.e., modeled, they do not sustain themselves; the eye, so to speak, passes through and seeks something beyond them. Blue and translucent red alone without painting or modeling, present to the eye a solid and intense colored surface, at which it stops.

We have seen (Figs. 2 and 6), that the painters reduce the radiation of the blue by placing on the blue a screen painting, that diminishes the area, and changes its tonality for the benefit of adjacent less radiating colors. But as for the grounds of subjects in the 12 th and 13 th centuries, it was very rare for blue grounds to be charged with a screen painting; thus to oppose the radiation of these blue grounds, the glass painters took care to place many strips, white details or very light greenish blue, in the subjects placed on those grounds. Indeed light grayish blue, which has a radiation equal to sapphire b blue, retains all its value beside this sapphire blue; it is the same or nearly so for certain pale purples and lilacs, and certain glaucous greens. Thus these tones are very frequently employed in the subjects or ornaments detached from a frankly blue ground. To prevent the blue grounds from radiating beyond their perimeter, the artists of the 12 th and 13 th centuries employed a means, that never failed in its effect. They placed around this ground a red strip and then a white strip. Here is the result produced then; the presence of the white strip prevents the red from becoming violet by the radiation of the blue. Take a subject A on a blue ground (Fig. 9); if this blue ground is enclosed by a red strip B, and that by a white strip C, the radiation of the blue has no effect on the red strip and does not make it violet; this red retains its purity and much enhances the delicacy of the blue tone. The effect of the white strip will be still better if thi strip is pearled as indicated at P, because the white being reduced to repeated touches assumes more firmness. But if one does the contrary, i.e., places

the white strip at B inside and the red strip at C outside, t the white will be slightly blued by the vicinity of the blue, and it will no longer present for the red a contrast to accent its brightness; therefore the red will be tarnished by the radiation of the blue passing across the white.

By an experiment easily made by every one, it is easy to take this effect into account. If the red strip be placed between two white strips (especially if pearled), it retains its value and one obtains a harmony of extreme delicacy; for then between the red, that loses nothing of its quality, and the blue is interposed a pearled strip, that forms a most happy transition between the red and the blue. Indeed, the placing of red and b blue is dangerous, it is a real discord, and it was employed w with much skill by the glass painters of the 12 th and 13 th centuries. If by the outer position of white the red retains i its quality and is no longer subject to radiation from the blue, the harmony is hard; if the white is wanting, the red is tinged with violet and assumes a false quality; the interposition of a greenish or yellowish white between the red and the blue (on c condition of having white also outside of red) produces the most happy effect. The painters that executed the beautiful g glass windows of Chartres, Bourges, etc., frequently employed this means of setting blue grounds.

After having studied our most beautiful French stained glass, it can be established that from the point of view of harmony of tones, the first condition for an artist glass painter is to know how to regulate the blue. Blue is the light in the glass, and the light has value only by contrasts. But it is likewise this luminous color, which gives a value to all tones. Compose stained glass into which blue does not enter, and you will only have a ducc or crude surface, that the eye will seek to avoid; scatter some blue touches in the midst of all these tones, and you will at once have piquant effects, if not a wisely conceived harmony. Thus the composition with blue glass strongly occupied the glass painters of the 12 th and 13 th centuries. If there be only one red, two yellows, two or three purples and two or three greens at most, there are infinite hues of blue, from the light linen gray blue to the dart violet blue, and from the glaucous and turquoise blue to the slightly greenish sapphire blue; near these blues are placed with a very refined observa-

observation of the effects that they should produce on the other tones, and that the other tones should produce on them. For example, very happy harmonies are produced with glaucous blue tones and reds (the red as a ground, it is well understood), w with the same blues and indigo blues, and with emerald greens. The association of the green and blue, so dangerous, gives to these artist colorists tonalities of extraordinary refinement, examples of which can be found only in certain Persian enamels and in the flowers of our fields. Everyone has cast his eyes on the soft harmony of the flax,flower on the green. But just as nature has always placed greens suited to each coloring of the flower, these artists have done similarly, perhaps inspired by those models. Always in the great glass windows or those w with legendary subjects in the 12 th and 13 th centuries, the eye is never shocked by those blemishes, that appear in the stained glass of later epochs. The harmony is never deranged by a touch badly placed; all is connected and joined together, as in the beautiful rugs of the Orient.

Evidently for each composition, each stained glass window, a tonality is adopted by the composer; one can almost say that there are stained glass works in a minor or major tone. That is apparent in edifices in which exists a great number of these glass windows, like the cathedrals of Sens, Bourges, Mans, Chartres, Tours, Troyes and Auxerre.

Still this old glass never assumes russet colors, covered by an amber glaze sometimes given to certain glass of the 16 th century, that our modern glass painters take as a warm coloring, but which has the great inconvenience of lacking light, a and of giving a false tone to interiors, without air and without depth; so much so that in an interior affected by this coloring like that of a lamp,it appears as if one chokes, and as if all objects approach the eye.

Partly to the judicious use of blue in their glass, the artists of the 12 th and 13 th centuries owe the giving to glazed interiors a depth and a pearly atmosphere, which makes them a appear higher and longer than they altually are. Blue is then the base of the coloring of the glass; but it is likewise a danger into whice the artists of the 13 th century have sometimes fallen by giving some of their glass a disagreeable violet tonality, or an excessively cold tonality, that affects the sense

of sight just as an acid affects the palate. [1]

Note 1.p.399. Among these glass windows of a tonality tinged with violet, we will cite one of those of S. Chapelle of Paris, (south side of the sanctuary), and among those of an excessively cold tonality, the north rose window of Notre Dame of Paris.

In the glass windows of the 12 th century, the borders assume much importance, as may be recognized by the example just given (Figs. 7, 8); as for the grounds between the subjects, they are reduced as much as possible, and are composed of ornaments rather than spots or small squares, as practised in the 13 th century. At that epoch when legendary glass was very common, i.e., composed of small subjects comprised in the same window and placed on a sort of uniform tapestry pattern, they assumed to give to this tapestry pattern, on which they placed the panels with subjects, a tone that could not rival the colors composing those subjects. For these legendary subjects, red was scarcely suitable. Its intensity absorbed the details distributed in these subjects: it made the use of purples very difficult, if not impossible, and allied itself badly with yellow: so that to color on red grounds the clothing of persons, the painters were reduced to tints of blue, to certain greens and white. They therefore adopted with very rare exceptions blue grounds for the legendary subjects, which permitted the use of all the mixed tones, and evey yellow and red, when placed with skill. As for t the tapestry pattern on which the subjects were placed, it was then necessary to find a coloring relatively neutral, which would allow the medallions to gleam. Desiring to attain that effect, the coloring could only seek a relatively dull tonality, but at the same time velvety and full. Red and blue were the colors which best fulfilled the purpose by their mixture, but by avoiding tones tinged with violet, which destroy all harmony. Here are then some of these grounds from the beginning of the 13 th century, chosen from those most successful (Fig. 10). [1] The first at A, presents an equal alternation of red and blue glass, i.e., the squares r are red and the squares b are blue. The glass painter has left in contact the pure reds and pure b blues, separated only by the leads: thus he has obtained a radiation of the blue on the red and a violet tinge, but he has painted at the middle of each square a [illegible] black strong enough to stop this radiation, so that the red t

touches seen in the interior of the screens remain very frankl y red, and the radiation of the blue is lessened. At a distance the violet tinge of the borders is made neutral and dull by the vivid brightness of the red glass reduced by the painted screens, and by the freshness of the blue tones likewise reduced. Thus the general effect is this; a neutral tone, purplish, tending to blue and to red, on which sparkle the very pure red and blue touches. Since this neutral purplish tone is only the product of the two colors placed beside each other with the pure brilliancy found at certain points, there results a general tone, harmonious and velvety (although a little dark) with a good effect. The second example at B presents blue squares separated by red bands. The reds are left pure, while the blue squares are covered by a gray screen, that much reduces their radiation. Due to this painting, the blue itself takes a dull tone, a and the red bands alone retain a brightness somewhat purplish at the the edges by the vicinity of the blue strips left along the leads. The border of the first example A is composed of f flowers blue at the top and alternately white or yellow below, detached from a red ground. Note that the red is pure, and that the blue, white or yellow are covered by ornaments. The strips a are white and b are blue. The border of the second example c presents alternating white and yellow lozenges separated by b blue disks on a red ground; the strips are the same as above. By the presence of white and yellow, the red in the borders is entirely relieved from the radiation of the blue, which is also reduced by the painted screen. These borders thus arsume a very vivid brilliancy, that further dulls the grounds and relegates them to the second plane of the general harmony.

Note 1.p.400. From the legendary glass windows of the apsidal chapel of Notre Dame of Semur.

Let us also present two other examples of these grounds (Fig. 11), in which white and yellow occur. In the first example A t the painted scales are blue, their beginning is yellow and their enclosure is red; the red is restricted only by a simple line. As for the blue, the gray screen lessens its radiation, yet not enough to prevent a purple tinge for the red. But the straw yellow touches near the junctions of the red borders restore to them their brilliancy near these joinings. The effect is singularly harmonious and warm.

In the second example B the scales are likewise blue, the enclosures red, and the little floriated disks are greenish white; the blues are always painted, and there are white spots with this painting, tha leisen the radiation of the blue.

One will note that the principles of coloring given above are followed with perfect tact in these grounds. The gray painting on the blues always leaves an edge of pure blue near the leads, so as to profit by sufficient radiation to soften the edge of the red. But so that this red at a distance may not appear too purplish by the blue, either the red is occupied by a black design, as in example A (Fig. 10) or the white and the straw yellow oppose the radiation of the blue as in Fig. 11.

But if in the composition of glars windows, as in all branches of the architecture of the middle ages, there are principles from which the artists never wander, when it comes to applying these principles, they make proof of great liberty and an unusual fertility. These grounds between legendary subjects, these tapestry patterns, are not composed alone of these spots, small squares and scales, but also of scrolls and interlacings, arranged in design and color so as to allow the subjects to be clearly detached. Here (Fig. 12) is an example of these kinds of grounds. [1] The blue serves as a ground for the subjects, red for the tapestry, the medallions A are yellow softened by gray hatching, surrounded by a pearled white strip likewise reduced by gray lines. As for the scrolls, they are composed of greenish white glass, blue (ashy blue), greenish blue, with bluish white, yellow, intense blue and emerald green, the three last tints in small quantity. These blues of different tones radiate sufficiently in spite of the painting covering them, to make the red a little violet at the edges, which gives to this tapestry the velvety brightness necessary, while remaining brilliant. The subjects are surrounded by a red strip edged by two white pearled strips. The pearled strip separating the border from the tapestry is pale green, the border has a blue ground, the leaves being alternately white and dark purple. The enclosing band is white by custom. Here the border is in a cold tonality, pearled, and it enhances the tapestries on red ground. The subjects are also generally kept in a cold and pearly tonality, so that they are detached by the delicacy of their coloring from the strong ground of the tapestry, that serves them

as a ground; and this delicacy of coloring of the subjects is recalled by the border. The yellow mediallions serve to connect the powerful coloring of the tapestry and the refined brilliancy of the subjects and borders.

Note 1.p.403. From the windows of the north transept of the church of Notre Dame of Dijon. (About 1230).

We would abridge these infinite details of the art of the glass painter, but it is difficult to be more brief, if one assumes to make a review leading to a practical result. We are sufficiently led to believe, that in questions of coloring, i instinct plays the principal part; it may be useful to make known that observation and the knowledge of certain laws are no less essential to the artist, so much so that this knowledge has never been a hindrance to those, who being naturally endowed with the qualities of a colorist, are called to decorate edifices.

Before carrying farther the study of the transformations of the procedures of the coloring of stained glass, it appears necessary to return to the so essential parts of the composition and the design of the cartoons.

The little that we have said on this topic however suffices, we believe, to emphasize an important point, viz:-- that the procedures of the composition and the design of stained glass differ from the procedures of the compositi n and the design of opaque painting. The art of the glass painter substantially varies from the art of the painter. Light passing through colored surfaces, in regard to the relations of these colors to each other, has an effect different from that exerted on opaque surfaces; light transmitted through a design likewise modifies its outlines, causes what it does not produce, if it directly strikes on a painted surface. For example, assume two inscriptions identical in dimensions and form, one traced in white on a black screen, the other drawn in black on white or very light b blue glass. If daylight passes through these two inscriptions placed side by side, the distance at which one can still read the inscription in white on a black ground will no longer permit the reading of the inscription in black on a light ground. The difference will be such, that if the inscription in black is read at 32.8 ft. (as the extreme limit of distance), the white inscription on a black ground can still be read at 49.2 ft.

If one recedes more, the black inscription will entirely disappear, and the white inscription will show a white glimmer on the black ground, but will not entirely vayish while the object from which it is detached will be visible. That is the effect of the radiation of light, whose effects have already been indicated, when it is transmitted through colored surfaces. In r regard to the design, let us return for a moment to these effects.

The radiation of light passing through white glass on which is placed a screen, causes the parts not covered by the screen to appear larger thay they really are, this beiug at the expense of the borders of the opening. passiug through a blue glass, the radiation of the light makes the edges of the screen indistinct and tinges bluish a zone of the enclosing opaque surface. Passing through a veined red, the radiation is manifested by very vivid sparkles, but without coloring the opaque borders in a diffused manner' if this red glass be of uniform and intense tone, the actual tint almost entirely disappears at a d distance, and seems to be a spot of livid brown. Passing through a yellow glass, the radiation detaches very distinctly the edges of the opening without streaks, does not change its dimensions to the eye, but the yellow tint appears darker at the centre than at the edges. According as the green and purple tones approach blue, yellow or red, the opening left in the screen will participate more or less in these qualities.

Fig. 13 gives an idea of this phenomenon. The square C is the actual opening left at the middle of the screen. The white and the three colors will produce in this opening at a certain distance the appearances, that we present here. These aspects then have an influence on the disign, that must be taken into account, and with which the artist glass painters of the 12 th and 13 th centuries were greatly occupied. So they employed white and yellow to outline clearly the principal forms of the glass, notably to place around the glass a margin 3/4 or 1 1/3 ins. wide, that detaches it from the panels or tracery of masonry; thus they proceeded around panels of legendary glass. If they paint the lines and shadows of the design on blue, they take care to make them wider and stronger than if red, a and especially than if on yellow or white. Besides, they utilized the influences of tones on each other to neutralize too p powerful effects of radiation. On the white strips they paint

pearls, or a straight or wavy black line. For the clothing of figures, they avoid employing the qualities of the clear blue of the grounds, that by its radiation would cause to disappear the lines placed thereon; they use grayish, turquoise or greenish blue. The more or less firmness to give to painted hatchings producing shadows, is not indicated on the cartoon, if as we have explained above, the master has the glass cut on a line before the indication of these hatchings, the glass being cut and assembled on the painting frame and exposed to daylight, the painter increases or reduces the modeling according to the more or less radiating quality of each piece.

The influence of the tones on the design being thus recognized, we are going to examine how the masters proceeded to compose, trace and model the figures and the ornaments of stained glass works.

In their compositions, they avoided as much as possible groups of persons or of parts of ornament, so as to allow the ground to be divined throughout the entire extent of a motive. In that the composition of the glass differs from that of opaque painting. Just as it is proper in the latter to group the persons in a scene so as to detach them most frequently from each other, it is just as necessary in stained glass to separate t the personages by causing the ground to appear frequently around each one of them. At a distance because of the vivid translucent tones, if the persons are grouped in a sufficiently great number, it becomes difficult for the eye to comprehend them separately. The absence of all linear or aerial perspective, the impossibility of reducing tones without making them opaquel which makes a spot and produces confusion, unless one finds the ground at least by openings, that outline the contour of each figure. The same for the ornaments; not only should the leads outline them distinctly, but also the ground tone. The glass painters of the 12 th and 13 th centuries rarely failed in this elementary rule.

By an analogous reason, the movements and gestures of persons are strongly accented and exaggerated, the forms of the ornaments being very vigorously drawn. The translucency of the tones tends to soften the outlines and confuse them; it is then necessary to guard against that result by very firm, exaggerated and detached drawing; it is frequently necessary to increase the

vigorous line of the lead by a black edging; and to avoid heaviness, to leave between this black strip and the lead a strip of the pure local tone, as we have seen practised in the examples from the 12 th century. (Figs. 5, 8).

The procedure of design adopted in the 12 th century, still impressed by the traditions of the Greco-Byzantine school, was then so well suited for painting on glass, but could not be c continued in France in an epoch, when the lay schools were developed, which tended toward naturalism in painting as in sculpture.

The glass painters of the 12 th century, like the Greco-Byzantines in their paintings, always sought o cause the nude to appear in spite of the draperies covering it; the most ample clothing appeared in these works as if glued on the projecting parts of the body, and was developed ou side the human form as if moved by the wind. One feels in that manner of translating nature an antique tradition, a recollection of the importance given by the Greeks to the nude in their works of art. Christian ideas no longer allowed the representation of the nude; it was covered by fabrics, buh so as to cause to be understood, that men did not entirely forget what had been the glory of antique Grecian art. The artist glass painters, like the sculptors of the 13 th century, studied nature as presented to their eyes, and had no reason to retain the hieratism so dear to the Byzantines. From the beginning of the century, men recognized in paintings on glass the influence of the study of nature by the manner in which were treated the draperies, in the features of the heads, the correct expression of pose. These modifications brought into the art of the glass painter by the lay school have such a value, that we believe it necessary to insist on it by examples. Fig. 3 shows a fragment of stained glass of the first half of the 12 th century entirely impressed by the Greco-Byzantine procedure. Fig. 5 already shows progress, made, a tendency toward observation of nature, in the manner in which the draperies are drawn. Now this king of Judah represented by Fig. 5 cannot have been painted before 1145, since it belongs to the part of the cathedral of Chartres that dates from 1140. Here now (Fig. 14) is one panel of stained glass from the cathedral of Bourges, replaced in the stained glass of the 13 th century, but which evidently came from the church built

during the second half of the 12 th century. [1] The design of t this panel, that represents the two apostles Peter and Paul, still affects to subject the folds of the draperies to the nude; yet there are in the poses, gestures and the fabrication of the draperies, a tendency to free themselves from Greco-Byzantine archaism. That tendency toward the study of nature by abandoning the Greek traditions, is marked in a definite manner in the f figures of angels, which accompany the representation of the Holy Virgin of the stained glass of the cathedral of Chartres, called "Our Lady of the beautiful stained glass." This stained glass shows us the figure of the seated Virgin, belonging to t the school of the 12 th century. But this subject has been enclosed by borders and angels, that date from a restoration made during the first years of the 13 th century.

Note 1.p.407. It is known that at the cathedral of Bourges there still exist important fragments of sculptures belonging to the 12 th century. (North and south porches).

Attempts toward naturalism are evident in these restorations or additions. We take from that stained glass one panel (Fig. 15), representing one of the angels that hold the torches at t the feet of the Vergin, entirely permeated by the archaic style of the 12 th century. [2] The folds of the vestment of this angel are no longer treadte in accordance with the hieratic tradition of the Byzantine school; there is no longer the affectation of causeng the appearance of the nude in spite of the natural movement of the draperies. The artist has further endeavored to allow the ground to appear, in order to show clearly the outline of the figure. The legs, arms and wings are detached as much as possible.

Note 2.p.407. See the whole of this stained glass window in Monographie de la cathedrale de Chartres, published under the direction of M. Lassus. (Drawing by M. Paul Durand).

With the style of the design, the mode of execution likewise changed.

In the stained glass of the 12 th century, the oldest half tints are used; and this essential part of the modeling of the glass merits attentive examination, since it has been the subject of discussions more extended than conclusive. Theophilus [1] clearly indicates the procedure employed for laying the half tints. He says:-- "When you have placed the principal shadows

on the draperies of that kind and they are dried, all that remains of the glass will be covered by a light tint, not as dense as the second shadow, nor as light as the third one, but which is a medium between the two. That being dry, with the handle of the brush you will make at each side of the shadows first laid fine lines (scratches) , so that there remain delicate and clear lines between the first shadows and the second tint." Theophilus thus allows three operations for the modeling; a first consists in laying with the brush the first or rather the principal shadows; a second consists in passing over a light half tint as a glazing; then a third consisting in placing a rather intense half tint beside the shadows, taking out the lights so as to leave delicate lines between this half tint and the shadow, t thus to obtain the great lights. Here the procedure is brielfy indicated; by examining the stained glass of the 12 th century, let us see how this result was obtained. On this glass is indeddd noted a primary work of shadows made by hatchingr, not s absolutely opaque, very delicate and transparent at their beginning very full at points where the shadow assumes importance, but still transparent. After this primary work, the glass is subjected to a first fixing, which Theophilus does not mention, but which is perfectly indicated by the old glass. This primary shadow being thus vitrified, cannot be changed by the addition of a second tint. The painter they laid this second tint, that made the strong half tint, and he took care to limit its extent and draw its outline by scratching the glass with the handle of his brush, particularly between this strong half tin and the shadow. He did not have to fear removing that already vitrified, which facilitated the execution of this delicate work. Did he place the lightest half tint before the more intense one? That is probable, for nothing prevented his doing so; but what is important, and of which Theophilus says not a word, is that over the burned principal shadow, dark but transparent, the painter laid opaque tints, the brush being charged with thick color, to obtain an increased shadow without translucency. The glass was placed in the furnace again, and the half tints as w well as the strong lines were vitrified. [1] The latter are pasty with a projection very sensible to the touch; in brief are perfectly clear without cracks or fusing with the first shadow. T Thus were modeled the beautiful glass windows of the 12 th cent-

century, of Notre Dame of Chartres, of the abbey church of S. Denis, of the (old) cathedral of Bourges. Let us take a bit of stained glass of the 12 th century (Fig. 16), that we reproduce at full sixe. With the brown color, dark but still translucent, the painter has traced the principal folds of that sleeve, then the piece was placed in the furnace. This first preparation being vitrified, he laid the half tints, while taking out the lights with a point, and the thick pasty opaque lines on t the vitrified shadows. On the lower part of the elbow the painter has laid a half tint by hatchings placed on the evidently vitrified primary shadow, for otherwise the delicate lines of that first shadow would have been wetted and mixed by the liquid holding the half tint in suspension. It is evident that as Theophilus indicates, clear strips have sometimes been removed between the half tint and the shadow to recover the local tone, as stated above. The placing of the half tints on the stained glass of the 12 th century thus had great importance; it required two firings and by so much increased the cost of these w works. Hence from the beginning of the 13 th century, when the greater dimensions of windows gave to the artist glass painters enormous surfaces to cover, they sought processes both more rapid and less costly. The glass is burned in the furnace but once; the half tints are laid beside and on the shadows and mix with them a little, because the brush, however lightly handled, carries off some of that shadow in laying this half tint. Further, they always use a point or the handle of the brush for clearing the outlines of the half tints and to obtain pure strips, but they can no longer have the clearness of those drawn on the glass of the 12 th century. Thus was modeled the angel of the beautiful glass of Chartres (Fig. 15). The detail A (Fig. 16) explains this procedure. Later the half tint is laid flat, the shadow line being dry, just as one would lay a water color by rapidly passing the brush slightly charged with the tent. The shadow hardly mixes with this light wash. These material means were modified again toward the end of the 14 th and during the 15 th centuries, as we shall soon see.

Note 1.p.408. Divers. Art. Sched. Book II, chap. 21.

Note 1.p.410. Our glass painters that have skillfully restored the stained glass of the 12 th century, particularly MM. Coffe-

Coffedier & A. Gerente, must have proceeded in this manner. Fr Fragments of this stained glass in our possession prove being burned twice.

There is no need of having seen many Greco-Byzantine paintings, either in manuscripts or in the monuments of the East to verify the intimate relations, that exist between the procedures employed by the Greek artists and those of the West in the 12 th century. There is the same archaic mode of tracing the folds, the same fabrication. One can easily establish the difference separating these procedures in painting from those adopted at the beginning of the 13 th century for stained glass. The style of design likewise suffers a complete transformation; the tendency toward the dramitic idea, toward expression, and the study of nature , appear in the art of the glass painter, when t this art is practised by the lay schools. The pose loses its archaic charm, heads are no longer drawn according to a conventional type, the clothing is that of the time and is faithfully rendered; the execution is more free, less severe, less refined and compact, it looks for effect. It denotes a profound experience of the means prictised por obtaining the most complete result by the aid of the simplest means. The dramatic tendency is particularly marked among the artists of the beginning of the 13 th century. The cathedral of Bourges, so rich in very beautiful stained glass of that epoch, is an inexhaustible mine, from that point of view. Several of these stained glass windows are executed with perfection, others evidently in haste, but from cartoons of skilful masters. Let us take one of these panels (Fig. 17), that represents the children of Jacob bringing the bloody garments of Joseph to their father. One indeed again finds here some traces of the Byzantine method; the draperies still indicate the nude at several points. But the western naturalism, the dramatic intent, appear in this composition. The figure of Jacob notably no longer has anything archaic; it is entirely inspired by true feeling, the observation of nature taken in the fact; no more reminiscences of antiquity. If we examine the details of these last examples of stained glass, we shall again be more strongly convinced of the changes, that the art of the 13 th century brought into the art of the glass painter as well as to the architecture itself. Fig. 18 is the head of a woman from the middle of the 12 th century.[1] In this ex-

example, one cannot ignore the antique influence transmitted by Byzantine tradition. The resemblance of this figure to certain paintings of the catacombs of Rome is striking. These are sister arts. Fig. 19 is a tracing at full size of the head of S. Paul from the panel (Fig. 14). These two examples show an execution sought to obtain an effect on account of the distance of the observer, and the radiation from the light purple tawny glass. But when the glass painters of the 12 th century desired to attain greater perfection because the glass was seen near at hand, because those glass painters held to employ all the resources of their art, they aerived at results never surpassed until now; for without abandoning the principles of painting on colored glass and the broad style of drawing suited to this kind of painting, they obtained a refinement in modeling, that rivaled the most delicate works. V. A. Gerente, whose choice collection is known to amateurs, possesses a head from stained glass of the 12 th century, that is a real masterpiece. He was willing indeed to entrust i to us, and we give it here (Fig. 19 bis), a tracing made with the most extreme care. In this piece may be verified perfectly the procedure of twice burning. The painter first laid the stronger half tints like a light cameo, which indicated the masses of the modeling; t the piece was then placed in the furnace; then it returned for the thick and pasty painting, to form the principal lines, the black shadows of the haid and beard, and the very thin scratched lines were made with the point. The most delicate of those scratches have scarcely the thickness of a hair. They a are visible on the eyebrows, the beard, and even on the top of the head. It is certain that these thick and pasty shadows, very perceptible to the touch, were placed after a first burning; for at some points this opaque enamel has scaled, and below it is perceived the primary half tint, that adheres to the glass. The lightest half tints must have been laid likewise after the first burning; for being passed over that primary half tint at several points, they have not affected that primary tint. Further, with the means of painting now in use, we cannot obtain similar results, than washed basal half tints, whose texture is not perceptible, even under a lens; our grays of iron oxide are always a little sandy, however well they may be ground. The gray placed on this head (Fig. 19 bis) is transparent, warm with a

bistre tone, and does not chill the local light purple bistre tone of the glass, as would be done by the gray of the 13 th century, or that employed by our gla s painters. There is no need, we believe, to emphasize the grandeur of style of this painting, which at a distance of 32.8 ft. retains all its energy. One no longer sees a trace in this head, of the conventional forms of the Byzantine school. The mouth and eyes are drawn by a master with a wise observation of nature, no longer with the procedures of recipes transmitted to us by the degenerate Greek school. Thus we regard this work as belonging to the end of the 12 th century, to the epoch when art tended to free itself from hieraticism, without completely abandoning t the perfect means of execution employed during the first half of that century. In this figure as in that of S. Paul, the artist seeks the personal expression (especially in the last, F Fig. 19 bis) from the types consecrated by the Byzantines. However, between this Fig. and that we give (Fig. 20), which is traced from the head of Jacob in the panel, Fig. 17, there is an entire revolution in the art. Here the expression reaches exaggeration. This design is evidently conceived so as to produce the effect sought with the distance and the translucent lights.[1] This bold and powerful drawing, strongly true in its exaggeration, has nothing more of Byzantine art, and it recalls rather certain paintings on Greek vases of high antiquity. This is the moment of the climax of painting on glass, the point of contact of the last vestiges of the arts inspired by the Byzantines and the tendencies toward naturalism. Already (Fig. 21) this head traced from the stained glass of the S. Chapelle of Paris (about 1240) indicates the abandonment of the true decorative style, and the next (Fig. 22) from the stained glass of the legend of S. Thomas of the cathedral of Tours (about 1250),[1] visibly inclines to the dramatic. It is evident that during this period comprised between 1190 and 1250, artists abandoned the accepted types, and soon also the decorative procedures inherent to painting on glass. They always proceed by lines, the l lead se ting accenting the drawing of the outlines, but touches replace the broad modeling, that alone gives solidity to these translucent forms. Sometimes even, as in the example in Fig. 22, when the glass was executed very rapidly, the half tint is wanting. To better appreciate the difference in execution between

the glass of the middle of the 13 th and those of the 12 th centuries, we give (Fig. 22 bis, A) a head copied at two fifths full size from a fragment of about 1180, that is found in the northern rose window of the cathedral of Paris, and that very probably belongs to the stained glass o the old transept commenced under the episcopate of Maurice de Sully. Like the example in Fig. 22, this head belonged to stained glass placed at a great height, consequently destined to be seen afar and fully detached against the sky. One sees how the procedures employed by the painters differ in these two examples. Seen near, the head A (Fig. 22 bis) has a brutality in execution, that exceeds all that one could dare in this kind. Yet this head, seen at a distance of 32.8 ft. is changed into the appearance B. The glass employed is a light purple bistre. This tone, whose radiation is feeble, with the opaque shadows placed on it, produces a singular effect, that we leave to be explained by competent scientists. These shadows a a distance change by gaining on the narrow lights and lose in the vicinity of the broad lights. One can take into account this fact in tracing the head in Fig. 22 bis from the original, and by laying that tracing on a glass of the tint here indicated, as indeed M. Gerente desired to do in order to facilitate this study; place that fragment on a g glass, taking care that i is detached on the middle part of the sky. At a distance of 13.1 or 16.4 ft. the leads have already vanished and are mixed with the shadows; the shadows on the side behind the face have affected the half tint, and the mouth is already modifieda At 32.8 ft. distant the appearance is exactly that given by the Fig. B. Thus the lead outlining the maxillary bone, comprised between the two broad lights of the cheek and the neck is reduced to a light line, while it assumes great width under the chin, where the adjacent lights are narrow. Likewise the lead separating the front hair gains on that and changes into a cast shadow, this front light being narrow. A part of the light of the eyelids mingles with the sh shadow of the eyebrows, like the fugitive light extremity of t the lower lip, all surrounded by shadow and mingles entirely with the shadow. The half tints aid in producing these illusions, for if then are made to disappear, and one is limited to opaque shadows, the effect is no longer the same; all the lights encroach on the shadows, that are simply reduced in depth

and do not mingle. It is necessary, that in the vicinity of the shadow, the glass be less translucent by the application of a half tint, so that the light radiates with less vividness, or that its radiation may illuminate the shadows without causing any loss of their width. We do not know whether the studies recently made on light can give scientific explanations of these phenomena, but experiments are for us demonstrations to which everyone can have recourse. It is certain that these artists so scorned have acquired a long experience with these luminous properties of colored glass, and that in this respect as in all others, they could demonstrate them to those, who today appear to make so little of their works. Here is what comprises the lost secrets of painting on glass; lost because one does not take pains to analyze the means and procedures employed by the old masters.

Note 1.p.413. Tracing from a fragment belonging to M. Oudinot.

Note 1.p.417. These tracings were furnished to us by M. Coffetier.

Note 1.p.418. This last tracing is made half full size.

It is particularly in paintings on glass representing persons of large dimensions, that appears in an evident manner the science of observation of the glass painters. Unfortunately, there remain no figures from the 12 th century at a scale greater than human height; but of the 13 th century there are a great number in the stained glass of Bourges, Chartres, Auxerre and Rheims, and these figures are treated with that profound knowledge of the effects of light on translucent colored surfaces. Frequently in these figures of colossal dimensions, for the nude parts as well as the draperies, half tints do not exist. The gray is almost opaque and only acquires a little transparency near the borders of the touches of shadow. One can cite among the oldest figures of great dimensions a certain number of fragments from the choir of the abbey church of S. Remi of Rheims. Much of this glass dates from the epoch of the construction of the choir, i.e., from the end of the 12 th or the first years of the 13 th centuries. This glass at several times was very unskilfully reset in leads with the alternation of panels, but it was evidently executed by masters of consummate talent. Several fragments have a beautiful character and are conceived with rare skill to produce at a distance an entirely satisfactory effect. We

have had in our hands one of those heads, which was deposited with other panels in the attics of the parsonage, and we here give a copy (Fig. 22 ter, A), at one fifth full size. The face is coposed of eight pieces of a warm purple glass. The eyes a are cut in a green approaching greenish white; the hair is in purple glass with a violet tinge. The crown is yellow with blue and red stones. It is entirely covered by a tint of gray, and the lights are taken out with the point, according to the procedure of the 12 th century. At the distance of 65.6 ft., this head, so brutal in execution, takes an entirely different character. These are the features of a young man with a nascent beard. We present this appearance in Fig. 22 ter, B. The lead that passes from the corner of the right eye to the side of the nose, entirely disappears [illegible] over the first lights, and only furnishes a light half tint at its points of contact with the shadow. The strong touch on the nose at the side of the light passes into the state of half tint and is lost at its lower end. The eyebrow of the right eye is softened by the light strip passing into the shadow. The mouth is modeled with a very youthful softness, as well as the chin. As for the crown, by its delicate incised lines, it seems a jewel modeled with the most exquisite delicacy.

The great personages represented on the stained glass of the 13 th century, such as those of Notre Dame of Chartres, frequently present these phenomena, although they are generally in execution very inferior to the example just given; yet the principle is the same. The decorative feeling is never lacking until toward the middle of the 13 th century; as fo the composition of the design and the action, the artists inclined toward dramatic results. This new tendency then is very apparent in the c composition of the glass of the S. Chapelle of Paris, Notre Dame of Chartres, the cathedrals of Tours and of Bourges, which date from the first half of the 13 th century. Here (Fig. 23) is a panel taken from one of the glass windows of the cathedral of Bourges, that represents the martyrdom of S. Stephen. It is difficult in a small space to better express in composition the scene of the stoning of the saint. The action is expressed with absolute truth. Yet according to our preceding statement, the persons are detached from the ground as much as possible, whil forming a group. Further, the designer has not restricted him-

himself to remain within the limits of the enclosure, but passes outside them; this again contributes to the vividness of the scene. No longer is anything archaic in the folds; their drawing is faithfully given from nature. The clothing is that of the time and abandons Byzantine traditions, still so marked in the draperies of persons sculptured and painted toward the end of the 12 th century.

These new qualities are particularly applicable in the stained glass of our school of Ile-de-France, always restrained in even the most ordinary works. The stained glass of the S. Chapelle of Paris, so remarkable in the effect of the entirety, must have been executed with great rapidity; there are also discovered m many negligences; glass badly burned, subjects incomplete, the execution often left to hands with little skill. Yet one can everywhere recognize the conception of a master in the composition of the cartoons. The scenes are clearly expressed, and the figures ate skilfully grouped; the drawing is sometimes pure a and the pose always correct. This seated warrior (Fig. 24) supplies the proof, although the execution of the details may be insufficient. It is necessary to have had in our hands a great number of stained glass works, to have analyzed them, so to s speak, piece by piece, to render an accurate account of the procedures of this art. Translucent light so easily suppresses the opaque parts, like the iron bars, the leads anf the heavy lines, that the painter must keep strict account of this phenomenon. Now it is not by enlarging the shadows beyond measure, that one can oppose this effect of the light, for then only obscure spots are produced, which destroy the form instead of accepting it. [1] Yet in spite of that suppressing quality of the light, the least false line outside of the form shocks the eye more than it would on an opaque painting. Which demonstrates that however delicate the lines may be, they have their value in painting on glass. If they are in place, they are scarcely perceived; if placed contrary to the form, they torment the eye. Frequently the stained glass of the 13 th century, executed with haste and negligence, allow to be seen insufficient or coarse work, but this work is always intelligent; every line is a stroke, accents the form, and that with the procedures inherent to this kind of painting. It is not without motive, for example, that painters give to the extremities of the members a

exaggerated smallness; the light takes pains to remedy that defect, which is apparent when one holds the piece of glass near the eye, but disappears if the piece be in its place. For example, here is a hand (Fig. 25, A), traced from a panel of the 13 th century. The hand drawn from nature would give the outline B. If the painter were content to trace it thus on the glass with the modeling, admitting that this drawing be perfect, at a distance it would only present a confused, soft and formless mass; all refinement put into the drawing and the modeling would be lost labor. By accenting the form, reducing the light and exaggerating certain details, the artist of the 13 th century obtained the desired effect at a distance, together with the pose and the outline.

Note 1.p.424. This defect is very apparent in certain modern stained glass executed like opaque painting, but strengthening the shadows.

Still this exabfle, that we have expressly chosen, is one of those most approaching the actual form. But here is another (Fig. 26), that is much better in the requirements of translucent painting. The exaggerated curvature of the index finger, the great size of the end of the thumb, are made to emphasize the pose and oppose the light by facilitating the understanding of the form. By the use of those procedures the subjects of our legendary stained glass of the 13 th century are so visible, though generally of very small dimensions, that the scenes can be recognized, and the figures composing them seem alive, as if they were acting. It occurs frequently to us to touch t these panels with the finger, which at a distance produce an excellent effect, and to be surprised by the means employed by the artist glass painters to obtain that effect, the exaggerations and tricks allowed to them. The figures that appear most perfect, when seen close, have a singular strangeness, from the point of view of rigorous drawing. Parts of these figures are slender and out of all proportion, others are drawn with exaggeration; the pose is forced to impossibility, lines accented to heaviness. The panel from Bourges that we give , Figs. 17, 20, and whose appearance is excellent at a distance, presents to a near view all the means of forced execution, that we mention. The head, Fig. 20, in that respect is one of the works most interesting to study. Long practice in these effects of

light and distance is required to arrive at that exaggeration of the form, to that boldness justified by the effect obtained. It is clear that the more complex are the subjects and the more varied the scenes, the more the artists must had had recourse to these procedures, which consist in playing with the light to obtain a desired effect; for in the figures of a simple composition, they remain nearer the reality. The personage given here (Fig. 27) is in the last case. [1] The painting on glass is t the drawing A, the appearance at a distance is the drawing B. The leads disappear in the light; the hardness of the lines v vanishes, composing a soft and clear modeling. Yet the half t tints and the shadows are placed flat without blending; but the vicinity of the parts left without any work and the vicinity of the lights influence these tints and absorb the outlines, so much that a distance, one would assume a very delicate modeling, a succession of tones between shadow and light, that in fact d does not exist. If on the contrary this modeling was softened; if instead of being composed of touches of shadow of the same value and a very small amount of half tints of uniform intensity, the painter had followed all the transitions given by nature between shadow and light, this figure at a distance would present only a confused mass, or rather dull, soft and round forms without accent. Now this defect shocks one in the glass, that much later was treated like opaque painting. The traditions of the 12 th century remained in certain provinces until about the middle of the 13 th century. It is in Ile-de-France and in Champagne, the art of the glass painter tends toward the more attentive study of nature, in Burgundy for example, one again finds at the middle of the 13 th century traces of this Greco-Byzantine drawing and modeling. The glass of Notre Dame of Dijon, that of Notre Dame of Semur, which date from 1240 to 1250, and are therefore contemporaneous with that of the S. Chapelle of Paris , have an archaic character already lost in the French provinces. This S. Peter (Fig. 28) drawn from glass in the chapel of the Virgin of Notre Dame of Semur furnishes us with an e example of the little changed procedure in design of the 12 th century. Besides this gla s is executed with minute care. The artists feared the great areas of light; they multiplied the work in the folds of draperies and the lines to lessen the effect of the translucent coloring; there results a harmony sli-

slightly heavy, but of sustained value. The glass chosen by this school is particularly beautiful and thick with a velvety coloring. Unfortunately there does not remain a great number of these Burgundian stained glass windows, for the stained glass of the cathedral of Auxerre does not belong frankly to this school, and rather approaches the fabrication of Champagne. Let us also say, that in the glass of the same edifice and of the same epoch is observed the works of very different hands. Old and young artists worked at the same time, and if the young workers introduced in the works an advanced and novel execution, the painters belonging to the school of the past continued to employ their procedures. Thus for example, at the S. Chapelle of Paris, one notes panels, that have retained traces of the fabrication of the beginning of the 13 th century. Perhaps in the 12 th c century trade glass was made hastily and carelessly. Of this sort of glass no traces remain. It is true that the glass work of that epoch, that is preserved, was replaced in the 13 th century or exceptionally left in place,[1] which causes the supposition, that this preservation was due to its perfection, while the works of an inferior order were replaced. We always know only, that the stained glass of the 12 th century was incomparable in beauty, in choice of glass, composition or execution of the ornaments, or the setting in leads; one cannot say as much of the glass made during the 13 th century, particularly of that belonging to the second half of the century. Its harmony is not always happy, its composition is often careless and the execution is defective; the stained glars is irregularly fired and rudely set in leads. These negligences are explained, if one takes into account the prodigious amount of glass then required from the glass painters.

Note 1.p.427. From panels of S. Chapelle.

Note 1.p.430. As for example, in the apsidal chapels of the abbey church of S. Denis, in the cathedrals of Mans, Bourges and Chartres.

It is unnecessary to believe further, that this decorative procedure was obtained at a low cost, for stained glass must cost very dear. Some guild gathered its resources to furnish one stained glass window, [2] and generally these stained glass windows given by a trade guild are the most beautiful in execution among those decorating the windows of our great cathedrals.

A prince, a canon or an abbot gave a window. Thus these were a articles of price. The value of the original materials was considerable and men attached much importance, and not without reason, to the good quality and beauty of the glass. The setting in leads must naturally reach high prices. Leads were not obtained by drawing as today, but by planing, that required m much time and care. When one computes the number of linear yards of leads that enter into one panel of legendary stained glass, for example, he recognizes that there is a considerable value of material and labor. Today the setting well in leads of a square foot of legendary thick stained glass costs about $1. The glass being much less uniform in thickness than ours, during the 12 th and 13 th centuries, the cost could not be below that, taking into account the value of silver. So that we have said, that this irregular thickness of the glass, that makes so difficult the setting it in leads, is one of the conditions of harmony and of vivid tones. When the glass is flat and uniform in thickness, the light strikes a window at the same angle, from which results uniform refraction; but when on the contrary this glass is bent and irregular in thickness, it presents externally to the light, surfaces not all in the same vertical plane; from which results a varied refraction, that singularly adds to the relative brilliancy of the tones and contributes to the h harmony. Then the perfection of the product is often in inverse ration to the quality of the effect, in the matter of art.

Note 2.p.430. At the cathedrals of Chartres, Bourges, Tours, Auxerre and Troyes.

To set this glass of unequal thickness and bent, the glass setters of the 12 th and 13 th centuries employed leads rather large but with much space, planed from ingots (Fig. 29). The flanges of these leads being thick allowed the workman setter to bend them down on the inequalities of the glass with a stick, so as to hold their edges perfectly, as done in setting a bezel. The sections of these leads, sometimes very small, gives either flat plane or externally convex surfaces (B). Their width being large in proportion to their depth permits bending them easily to follow all the curves of the pieces of glass. They were joined by soldered points. The leads that we still have, dating from the 12 th century, are very narrow; they generally become wider in the 13 th century, especially in glass work with great subj-

subjects, and between them and the glass, one frequently notes the presence of a fatty resinous substance, intended to caulk the crevices.

If the artists of the second half of the 13 th century sometimes carelessly executed glass works, it must still be recognized that they produced a great quantity, whose appearance leaves nothing to be desired from the point of view of harmony of tones, design and execution. Among the latter we will cite the panels of the gallery of the choir of church S. Urbain of Troyes (about 1245). Three of those panels placed in the north aisle are executed with rare perfection. They are detached on grisailles; their grounds are red, green and blue, damascined with designs of extreme delicacy applied on a tint laid on the back of the glass and not on the painted side, which gives a particular softness to these designs. The three subjects represented are; the entry of Jesus into Jerusalem, the washing of the feet, and Jesus disputing in the synagogue. Here (Fig. 30) is a copy of the last subject. This panel is only 1.3 ft. wide; the figures are modeled with half tints partly placed on the back and lines painted inside according to custom. The heads seek individual and dramatic expression, but lack the grandeur and style found in the glass preceding that epoch; the draperies are evidently studied from nature,and no longer is to be perceived a trace of the seeking for the nude, still apparent at the middle of the 13 th century. Fig. 31 reproduces the head of Christ at full size; one would believe with difficulty that scarcely a century separates this painting from that given in Fig. 20. It is true that these three panles of the church of S. Urbain are exceptional, that these are miniatures on glass. They prove no less the degree of advancement of the art of the glass painter, the complete abandonment of the traditions of the 12 th century, the tendency of the new school toward naturalism and even mannerism.

Until then it was uncommon for colored panels to be surrounded by grisaille grounds. M. Steinheil, whose knowledge of painting on glass is well known, however mentions colored panels from the end of the 12 th century detached on ornaments likewise colored,but on a white ground.

This glass belonged to the cathedral of Chalons, that although dating almost entirely from the 13 th century, retains nu-

numerous fragments of the glass of the 12 th century, among others very beautiful borders. We reproduce here the drawing of t these ornaments on a white ground, that encloses the panels with legendary subjects on a blue ground. The entirety of the glass work gives the compartments presented at A (Fig. 32). The subjects are distributed in the quadrants of the circle c. At B is traced a detail of the spandrels d. We have indicated by letters, according to the method already given, the colors of the glass in this detail; i.e., the letters b, r and j indicate blue, red and yellow; the letters a, e, i, o, u are white, deep purple, light purple, emerald green and turquoise bluish-green; the yellow j of the circle is straw yellow, that j of the ornament being warmer. The harmony is severe, pearly, and strongly accents the medallions with subjects. This rare fact today;- the glass of the 12 th century being uncommon, -- must have p presented itself quite frequently at that epoch, we think, the tendency of the glass painters of the 12 th century being to design clear harmonies of limpid appearance. There exists at t the cathedral of Augsburg glass, whose large figures appear to date from the end of the 12 th century,and are detached on white grounds damascened in grisaille.

Legendary glass or that with great figures of the 13 th century on the contrary, has a powerful tonality, and the artists of that epoch did not think that this strong coloring could ally itself to the lightness of the grisaille. Yet however extensive were the glazed surfaces in the monuments, their coloring rendered the interiors of the naves very dark. From the second half of the 13 th century, they thought of giving more light in the interiors of edifices by composing the glass partly of grisaille, partly of colored panels. One conceives readily, t that this innovation must completely change the conditions of harmony. The pearly white surfaces of the parts in grisaille m must cause the adjacent colored surfaces to appear heavy and dark. Thus they introduced into the latter large clear portions, limpid and greenish blues, yellows, reds and very light purples, greenish or rosy whites. Besides the legendary panels or the great isolated figures were always surrounded by a blue ground, most frequently with enclosing strips. Besides the great mass of light, they thus obtained a notable economy over the stained glass of the great edifices, for the grisailles, even

those most elaborate, did not cost half the price required for the colored glass. In the high windows of the cathedral of Auxerre, that date from the second half of the 13 th century, there had already been attempted the use of this means, but there the grisailles are very broad and firm in design, which opposes the too great lucidity of those light uncolored surfaces, contrasted in the same window with the colored surfaces. The grisaille occupies only a small portion of the glass, and composes a sort of margin between the principal subject and the always colored border. Here is an example taken from the high windows of the choir of this cathedral (Fig. 33). [1] The ground of the figure and of the canopy over it is blue; the tones of the canopy are white, yellow, pale green, with red touches in the two little side openings. This very light harmony serves as a connection between the two bands B of the grisaille. It was the same for the glass, now destroyed and replaced by a panel of the 16 th century; the figure wears a robe of emerald green, a light purple mantle, a green cap with a white band. T The border is composed of bluish green and yellow leaves on a red ground. The light given by those kinds of windows is the more brilliant, when they are detached against the upper part of the sky. To oppose the overpowering effect of this light in the bands of grisaille, these are painted with thick lines with close latticing between the ornaments, so much that near the eye the surface of the lights is less important than that occupied by the opaque grisaille. In the same windows of the choir of the cathedral of Auxerre, grisailles occupying the same place are mingled with touches and strips in color. The effect is less frank and less intelligible. However to this last system the gla s painters of the end of the 13 th century adhered in the composition of many windows with large subjects or figures. The charming panels of the windows of the gallery of the choir of the church S. Urbain of Troyes, a specimen of which has been given (Fig. 30) are comprised between compartments of grisaille with colored strips. The high windows of the same church present a series of great figures of prophets with canopies, detached from a blue ground and comprised between panels of grisaille with colored strips (Fig. 34). The vestments of these great figures are generally clear and vivid. The borders are broad and solid in tone. That of the window here given is composed of the

arms of France; i.e., of a blue ground charged with fleurs-de-lis (yellow), without number, and a shield of gules (red) with a cross in argent (white), and four keys of the same in the fo four cantons (quarters), the wards upwards. Contrary to the mode adopted at Auxerre about forty years earlier, the grisaille of S. Urbain is refined, clear, little charged, in a manner to allow the gleam of the strips and the touches of color. This system was adopted in many monuments of the end of the 13 th century and of the beginning of the 14 th, notably at S. Ouen of Rouen, in the cathedrals of Narbonne, Amiens, [1] Cologne, etc. Sometimes the architectural canopy assumed great importance and was composed of clear tones, white, yellow, water green, with red and blue spots. During the 13 th century these canopies, although always in clear tones, are simple in design, little important in dimensions. They assume more space at the end of the 13 th century, and during the 14 th frequently occupy as much surface as the figures, that they crown. They are charged with architectural details, such as turrets, gables, rose windows, windows with mullions, crockets and cross flowers. Until then the architectural forms represented in the glass are translated into an entirely conventional manner; but toward the beginning of the 14 th century, the artist glass painters affect the more real imitation of these forms. One can cite as a first example of these attempts, the glass work of the chapels of the cathedral of Beauvais, that date from about 1310. Fig. 35 at quarter full size gives a part of the architectural decorations accompanying the subjects of these works in glass, and which a are of extreme delicacy. The tones of this architecture are white and yellow with some red touches on a blue ground. The non-radiating gleam of the yellow acquires the clarity and delicacy of metallic lights through these broad accented black designs, which produces a striking effect. [2] But this attempt with this meagre and cut-up design, causes regret for the richly colored grounds, wide borders, the ornaments so lavishly composed, that give the glass of the 12 th and 13 th centuries that velvety and profound harmony unequaled elsewhere. The borders of the 14 th century are generally narrow and are composed of designs of too small scale. The mullions which then divide the windows into vertical compartments of a width of 2 to 2.5 ft. compel the glass painters to reduce the borders and to diminish the isolated

figures. The spaces assigned these artists had no more width than we see them take during the 12 th century and until about 1230. The iron framework only forms cross-bars, i.e., horizontal bars, and the panels comprise the central composition and the border. The example in Fig. 34 is already exceptional for that epoch; but at S. Urbain of Troyes, the spaces occupy an enormous surface; it is rare that the panels of stained glass between mullions have that width after the second half of the 13 th century.

Note 1.p.435. See the entirety of this window in the work of R. P. Martin. Also the work of M. F. de Lasteyrie.

Note 1.p.437. There remains at Amiens only traces of this stained glass in the triforium of the choir.

Note 2.p.437. The tracings of this glass were sent us by M. Oudinot.

The legendary glass of the 14 th century is much less common than that of the 13 th. This art then visibly declined; the p principles of translucent painting that we have explained, and that directed artists for two centuries, were lost like the principles of monumental sculpture. Two causes contributed to in this collapse of the art of the glass painter; the search for the real and for dramatic effect, the less abundant resources in the midst of a society, within which civil life developed itself more daily. The guilds were occupied with their material interests, and no longer gave those beautiful stained glass windows, that had decorated the cathedrals and the parish churches during the first half of the 13 th century; the bishops and the chapters had great difficulty in completing their cathedrals remaining unfinished, and could not devote important sums to the execution of those marvellous paintings. Lay feudalism was already greatly impoverished, and only thought of fortifying itself in its castles. Also in the religious architecture then in favor, the surfaces of the windows had been so increased, that it became impossible to fill these areas by glass with subjects, without exaggerated expense. Thus it is a rare fortune to find a church of the 14 th century in France, that presents a complete example, or nearly so, of a set of stained glass windows made at a single spurt from 1320 to 1330; this the old church of S. Nazaire, the old cathedral of Carcassonne. (Arts. Cathedrals, Fig. 49; Construction; Figs. 109, 111).

The choir and transept of this church presents an enormous surface of openings, all filled with their stained glass of the beginning of the 14 th century. [1] This glass with legendary subjects has a brilliant harmony without being excessive, which is rarely found at that epoch, and belongs to a school with a centre unknown to us, but which we should be disposed to place at Toulouse, and whose products are found even to Beziers.

Note 1.p.439. In the choir, two of the old glass windows were alone replaced in the 16 th century. These two Renaissance windows are also excellent in execution.

The panel (Fig. 36) from the window containing the legend of S. Nazaire gives an idea of the style of the school: [2] the compositions are very good, the dramatic feeling is labored, and the pose therefore often falls into mannerism. The draperies are less understood than in our northern schools, but the choice of the tones, the entirety of the general harmony, count for much on what is done north of the Loire at that epoch. The glass is coarsely made, excessively irregular, thick, but with very beautiful value of tone. Some parts appear painted by skilful hands, as for example the figure of the woman in the panel (Fig. 36), and are executed with much spirit and skill. Among these glass windows of S. Nazaire must be cited that representing Christ on the cross, with the temptation of Adam, the prophets holding scrolls on which are inscribed the prophecies relating to the coming and death of the Messiah, as one of the most remarkable by its composition, choice of tones and firm design, solid, well modeled, and worthy of the finest glass painters of the 13 th century.

Note 2.p.439. S. Nazaire caring for the poor, the widows and orphans.

To be dated from this epoch (beginning of the 14 th century), except some glass quite remarkable for the general entirety of the effect, the design visible tends to mannerism. As for color, the beautiful harmonies of the 12 th and 13 th centuries are l lost, and the painters seek brilliant tones contrasting with the grisaille tones. The silver yellows were recently discovered, take too great a place and give a tame appearance to the glass. men seek to fill the grounds with a meagreness and with too forced a modeling. Large figures are avoided and grisaille daily assumes more importance. One no longer knows as before how to

establish a distinct difference between the art of the painter on a wall or panel and the art of the glass painter; on the contrary, the painting on glass daily tends more to seek the effects suited to opaque painting.

The disastrous state of France during the last years of the 14 th century and the first half of the 15 th scarcely allowed glass painters to exercise their talents. Thus the glass of t that epoch is very rare, and the little that remains to us of those works is of mediocre value. Yet grisaille glass was made, and the art was not lost, since toward the end of the 15 th c century it is seen to resume new life, but in conditions foreign to the older art. Three principal schools then appear, the school of Ile-de-France, that of Troyes and that of Toulouse; the latter was certainly the most elevated from the point of view where one must place it as relating to translucent painting. The school of Ile-de-France places on glass compositions just as suitable and even more so for opaque surfaces. For example such is the glass of the rose window of the S. Chapelle, which dates from the end of the 15 th century. The school of Troyes varies less from the conditions adapted to translucent painting, it still possesses a very just feeling for the harmony of tones, and the subjects are treated in a manner to profit by the qualities essential to stained glass. As for the school of Toulouse, it sometimes attains perfection; its style in design is broad and elevated; its value in the use of translucent colors rivals the best works of the 13 th century. But it is rarely in the beginning of the 16 th century, that this school reaches the climax. The glass of the cathedral of Auch, [1] that of the churches of Lambez and of Fleurance, are really very beautiful and with a tonality powerful and harmonious. Besides t the glass painters of that epoch in the north and south had found improvements in the details of manufacture, that allowed them to produce effects unknown before. They flashed certain glass, red, green, light blue, reddish brown and purple, and by removing on the wheel a part of these flashings, as done t todan for the so-called Bohemian glass, they obtained embroideries, and delicate details, which they could still color with silver yellow or certain enamel colors. [1] However, these colors, charming on the glass of an apartment, are completely lost in grand monumental decoration, and add nothing to the effect. The

palette of the glass painters was enriched by new tones. This means of flashing allowed them to obtain certain tones of a p power unknown until then; they had violet glass obtained by a red flashing on pale blue, greens obtained by means of several layers of white, yellow and blue glass superposed, [2] reddish brown purple produced by a yellow layer on purple; they also already employed enamel colors on white, so as to obtain soft and mixed colors, pale blues, rose (purple of gold) and lilac. The rose window of the S. Chapelle of Paris furnishes many examples of these applications of enamel colors, which one does not know how to make today.

Note 1.p.441. See Monographie de la cathedrale d'Auch, by M. abbe Caneto.

Note 1.p.442. See the beautiful stained glass window of the tree of Jesse in the church of S. Etienne of Beauvais, that p presents a prodigiously skilful use of these procedures bo remo-vol on the wheel.

Note 2.p.442. We have in our hands one of those green glasses from one of the windows of the 13 th century in the cathedralof Carcassonne (S. Nazaire), which is composed of a greenish white layer, a yellow layer, a white and a blue one, a thin white sh sheet and a yellow layer. We are inclined to believe that this glass is of Venetian manufacture.

But all these improvements in manufacture could not restore an art, tha abandoned its true principles. The last beautiful stained glass in the Renaissance, that is seen at Bourges, Paris, Vincennes, Sens and Troyes, are only from cartoons of painters transferred to glass. These works may have great qualities in composition, design and modeling, but have none from the decorative point of view. Their appearance is confused, dull or hard; the eye painfully seeks a design, that it would prefer to see on an opaque surface; the leads, instead of facilitating c comprehension, obstruct it, because the design was conceived without taking them into account. The perspective and succession of planes absolutely lose their effect and produce only weariness.

We voluntarily agree that the manner of the 15 th century a and even that of the 14 th was a sad deviation from the art among glass painters, but then still the great ornamental princi-ples of this art were not forgotten. Yet we prefer these defects

or weaknesses to the pedantry of the artists of the 16 th century, who pretended to transfer to glass compositions core or l less inspired by paintings of the Italian schools of that time, and to show their talents as designers, thay absolutely neglected to observe the conditions alone adapted to translucent painting.

We should not omit to speak of a school of painting on glass, that although not belonging to France, yet has not failed to exert an influence on the schools of the adjacent provinces of the East. Just as the Rhenish architecture of the 12 th century pushed its shoots even into Lorraine and also lower Champagne, so the school of Rhenish glass painters somewhat permeated our French ateliers. Within this Rhenish school the traditions of the 12 th century were prolonged very late, both in style and in procedures of fabrication. Also in the 13 th century glass was made at Strasburg that seemed to belong to a very much earlier epoch. The figures retain their archaic character, and the ornamentation is entirely impressed by a very pronounced Romanesque style. In France from the middle of the 12 th century, the ornamentation possesses its particular charm, which is perfectly distinguished from the design still admitted in sculpture; it is not so in Alsace even at the beginning of the 13 th century. The painted ornamentation of the glass is inspired by the same models, that have served for the composition of architectural ornaments. The procedures employed in painting on glass have a stiffness not found in our glass. Dating from the 13 th century, grisaille is destined to form the design and the shade lines are absolutely black and opaque, the half tints being composed of hatchings, and they do not have the warm translucency of our tints. Here (Fig. 37) is a border of ornament of the windows of the nave of the cathedral of Strasburg, that shows how strongly Romanesque traditions were still retained at the middle of the 12 th century, and how much this design approaches the forms accepted in sculptured ornamentation. The tones of this glass further approach the habitual coloring of the 12 th century; they are light; the whites, light blues, yellows and greens dominate. Thus the animals and heads are light blue, the circles are white, the leaves being emerald green and straw yellow. The grounds are red; the strip at the left is turquoise, the pearled band beside it is golden

yellow; the strip at the right begins white, then purple plates alternate with yellow rings between which is a green; a blue strip is placed against that border, and near the circles is a white strip. Sapphire blue and red occupy the least space; light broken tones are in the majority. An architecture in tones of green, white, yellow and light blue, composed of two columns with an archivolt, adds to these borders and encloses the red ground from which are detached the figures, likewise kept in limpid tones. [1] As for the flesh, the Rhenish glass painters generally employ glass less colored than that chosen by our French artists. We reproduce here (Fig. 33) a head of a figure (S. Timothy), that is seen in a window of the chapel of S. Sebastian adjoining the church of Neuweiler. This glass window, of which only the upper part remains, appears to belong in style to a very early epoch; yet the form of the letters of the inscription placed above the halo cannot carry this glass beyond the middle of the 12 th century. The character of the head of the saint is entirely impressed by Greek tradition, and recalls the most ancient mosaics of S. Mark of Venice; [2] here the half tints are laid by hatching, retouched at several places by the scraper. On the whole, the execution of this glass does not indicate the skill observed in the example, that we have chosen. (Fig. 29 bis).

Note 1.p.444. This glass of the cathedral of Strasburg is seen today in the windows of the northern side aisle of the nave, which dates from the 13 th century, but it evidently has been replaced there and belonged to the church of the 12 th century. The style of the figures leaves no doubt on this point.

Note 2.p.444. The fac-simile of this glass was sent me by M. Steinheil. The chapel to which it belongs passes for having b been built under Charlemagne, and indeed its construction may date from that epoch; but we do not think that the glass given here can have been painted before the beginning of the 12 th century.

Only at the end of the 13 th century the Rhenish glass painters appeared to entirely abandon the traditions of the art of the 12 th century. Also at that epoch, as proved by the construction of the choir of the cathedral of Cologne, that the style called Gothic took possession of architecture. The master architects, like the master painters, then desired to excel the French

models, that served them as types, they pretended to go farther, and already at that epoch fell into the style of mannerism, that we only see appear in our procedures fifty years later. Yet c certain (old) stained glass of the choir of the cathedral of Cologne possesses qualities of design and of style that cannot be slighted; as for the harmony of tones, it seems left to chance, and takes no account of the rules still so well observed by our artists during that period.

How can it be explained, that in France we have lost those qualities of colorists so evident in our glass and our paintings of the 12 th and 13 th centuries; qualities whose traces m may be followed until the 16 th century, and which from that time daily disappear from our edifices to take refuge very rarely in some easel paintings of our painters? Perhaps to the badly understood or badly directed study of the works of antiquity and of the Italian decadence, we owe the loss of that faculty possessed by our predecessors. Disdaining their works, it was entirely simple no longer to take account of the instruction they furnished. Rather than return to it, men preferred to admit once for all, that the French are not born colorists. A Among us men love to give to prejudice a sort of dogmatic consecration, that leads well to indolence of mind; this is a fatal obstacle against which we easily persuade ourselves, that our will or reflection cannot react; conscience being satisfied, one dispenses with all effort. It is very certain that the feeling for and experience in colored harmony has been lost in France for more than two centuries, and the pale attempts made in our days to color its architecture are a proof without reply. For example, is it not a mistake in the conditions of colored harmony applied to architecture, to assume that a happy effect will be obtained by introducing marble as an element of color in the middle of a stone structure? Marble with a warm a and often hard tonality, that has broken reflection, cannot ally itself to the light and transparent tones of stone, it is yet worse if the marble is employed with metal with sparkling lights. Then the stone loses all solidity to the eye, its tones and even its form become soft and heavy. One desires to dig into it, to redesign its edges and outlines.

No people that has left esteemed architectural works, has ever fallen into so profound an error. The Greeks colored white

marble, that they employed because of its fine texture; but t they colored it as a whole, and never attempted to place colored marbles beside white marble, and particularly beside limestone. The Romans, who had no very elevated feeling for harmony, never employed colored marbles simultaneously with stone left in its normal state. S. Mark of Venice, that presents externally and internally a colored harmony with such a happy effect, is entirely covered by slabs of marble of a very fine tone, mosaics and gilding; one sees not a trace of stone. The artists of the middle ages admitted painting to the exterior and interior of their edifices; but painting has not the rigidity of m marble; one does not submit to its tonality, but seeks for and finds it. They had painting for the interiors of the great naves. The coloring of the glass had the advantage of casting a veil on the opaque surfaces, a colored glaze of extreme delicacy, when necessarily the glass itself had a harmonious tonality. If the resources at their disposal did not permit them to adopt an entirety of colored glass, or if they desired the light of day to enter interiors in a purer manner, they adopted that b beautiful decoration by grisaille, which is again a colored harmony obtained by the aid of long experience of the effects of light on translucent surfaces. Many of our churches retain grisaille glass closing either all their openings, or only a portion. In the last case, the grisaille is reserved for the side windows, that can only be viewed obliquely, and then the colored glass closes the end openings, the apsidal openings seen from far in front. These lateral grisailles are always sufficiently opaque, that the solar rays traversing them cannot light from the enterior this colored glass. Yet these solar rays cast at certain hours of the day a pearly light on the c colored glass, that gives them a transparency and indescribable delicacy of tone. The lateral glass of the choir of the cathedral of Auxerre, half grisaille and half colored, then places on the entirely colored apsidal window a glazing with an agreeableness, an idea of which cannot be formed. The gleam of the opaline white light passing through these lateral openings, a and that forms a veil of extreme transparency beneath the high vaults, is traversed by the brilliant tones of the end windows, which produces the sparkle of precious stones. Then the forms seen to vibrate like objects seen through a sheet of clear wa-

water. The distances are no longer appreciable, they assume d depths in which the eye is lost. At each hour of the day these effects are modified, always with new harmonies, whose causes one cannot weary of studying, when he always holds to studying the causes of the effects perceived by the senses; now the more profound this study, the more one marvels at the experience a acquired by these artists, whose theories on the effect of colors (admitting that they had them) are unknown to us, and which the most friendly among us treat like frank children. Not admitting that frankness alone can arrive at results so complete in art matters; being well convinced on the contrary, that to artists is necessary a very superior knowledge of causes and effects to produce works always successful, and that in vast monuments, we are going to attempt to give a survey of the system adopted by the glass painters of the middle ages in t the composition and manufacture of grisaille.

The most ancient grisailles known do not date before the 12 th century, and these first grisailles are not combined with any colored portion.

There certainly existed in the 12 th century stained glass simply composed of ornaments very light in appearance, and in which consequently grisaille filled an important part. But of these kinds of glass we know only a single example, and this one had been so disfigured by coarse restorations, that we could not regard it as complete. This refers to the celebrated stained gla s work of the abbey church of S. Denis, in which were seen griffins in the middle of square panels. If one refers to a drawing that Percier made of this glass at S. Denis, before it was transferred to the museum of French monuments, these griffins formed the middle of the glass, which possessed three broad borders of ornaments in which white occupied a great surface. But this drawing would produce the assumption, that these griffins of the 12 th century and their panels were enclosed much later, perhaps in the 16 th century. [1] Yet one can conclude from the existence of these fragments, that in the 12 th century was made glass of ornaments with coloring.

Note 1.p.448. The stained glass in question here was faithfully reproduced in the work of M. Gailhabaud, "L'architecture et les arts qui en dependent," Vol. 2. But that reproduction gives with the griffins and their enclosure of the 12 th centu-

century, restorations without character and a deplorable harmony of tone, made thirty yeass ago.

Pure grisailles, of which we have examples from the beginning of the 13 th century, must still have existed before that epoch, for the design of those that we possess emphasizes the trace of traditions preceding the 13 th century. In the storerooms of S. Denis, at Chalons-sur-Marne, at S. Remi of Rheims, are still f found fragments of painted white glass, that very probably came from grisailles of the 12 th century. These old remains are powerfully modeled with half tints, according to the method adopted for colored ornaments. The drawing is full, broad, strongly retraced with grounds relatively reduced, and filled with a lattice in black or scratched on black with the point. The glass employed is thick, slightly greenish or smoky, often filled with bubbles, which gives it a very precious sparkling quality. Usually, this white glass is not very fusible and has been changed less by atmispheric agents, than the colored glass, which is deeply marked, particularly in the South. 2

Note 2.p.448. Notably at the cathedral of Chartres, certain glass is so pitted and covered with lichen, that it has lost all translucency. It is necessary to state that the glass of the 13 th century is more changed than that of the 12 th, which would cause the supposition, that already in the 13 th century, men had sought by fluxes to make the gla s more fusible. On this account, the stained glass made today will be lost in two or three centuries.

Here (Fig. 39) is a grisaille from the abbey church of S. J Jean-au-Bois near Compeigne. It is entirely without colored glass and dates from about 1230, although it still retains the character of the design of the 12 th century, especially in its border. It is particularly in these compositions of grisailles, that one can recognize how the artist glass makers knew how to profit by the lead setting to strengthen the design. The leads form the principal compartments, combined so as to avoid too fragile acute angles. From that point of view, the beautiful o panel traced here (Fig. 40), from the chapel of the Virgin of the cathedral of Auxerre, is a masterpiece of composition. This grisaille is likewise without colored glass; it occupies a wide window, and each square is 1.8 ft. from corner to corner. A - white border with plain strips encloses it. Its appearance is

pearly white with an extremely refined and soft tone. In the two examples, the grounds are covered by a quite firm black lattice made with the brush; some half tints are laid on the shadows of the leaves in broad hatchings. The design is an opaque blackish brown grisaille, slightly transparent at the edges. The cathedral of Soissons has in its nave grisailles of the 13 th century without color, with a grand decorative effect: the lines of the design are broad and complete; some glass presents varieties of white to better accent the principal framework of the composition. There was a resource of which the glass makers of the 13 th century did not deprive themselves. But they did not place uniformly that white glass of different qualities. For example, sometimes the framework of the composition is detached on the greenish ground by a slightly smoky tone, and t then the contrary occurs: so that the artist obtained thus the shot effect of silk damask in which as the light strikes the surface, the design appears in a dark tone on a light ground, or in light on a dark ground.

The end of the 13 th century still employed grisailles without color. The cathedral of Troyes furnishes us with beautiful examples of these uncolored glass windows. We give here two panels (Figs. 41, 42), whose execution is extremely refined and in charming composition. These grisailles appear to date from the last years of the 13 th century. But colored borders already accompany them, while always leaving a white strip between them and the panel of the opening. We have seen that at this epoch the glass makers frequently employed grisailles with figures c colored on a colored ground; but before the 16 th century we know of no example of figures painted in grisaille on white glass. Yet the artists of the 14 th century had employed opaque relief painting for the figures in certain cases; it then appeared surprising that they did not have the idea of doing this for translucent painting, or tha if they did so, no fragments of it remain to us. Observing attentatively the effects of translucent painting in grisaille, still one takes account of the reasons, that prevented these artists from applying this procedure to figures. However clearly composed may be glass work of ornaments in grisaille, however vigorous the design, o well accented are the grounds, there always results from these compositions an effect glistening to the eye, that re-

recalls the appeasance of a damask fabric, i.e., a vibrating e entirety whose pattern cannot be determined without wearisome attention. The essential condition of all uncolored grisaille is, that there remains no glass surface not covered by the work of the brush. There is necessary a uniform and regular d distribution, so that the eye may not seems to find a hole, a void in the translucent surface. Now in painting figures, it w was necessary to leave unequal light surfaces more or less large, on account of the modeling of the form. There results from this a series of luminous and dark spots scattered without order, w which produced a very bad effect, and did not invite the eye to rest on these surfaces. At a distance the whites assumed too much importance, and the shadows were reduced and formed spots. One can render an account of the disagreeable appearance of these subjects in translucent grisailles, if he examines certain glass of the Renaissance, where it was sought to render very slightly colored cartoons. The eye has great difficulty to distinguish the figures, to follow their contours and the modeling through those intermingled lights and dark spots.

It is not with grisaille glass as with colored glass; one can rest the eyes on the latter without weariness, if its coloring is harmonious, while the grisaille is only made to give a translucent tapestry, that does not prepossess one. The glance cannot rest long on that glistening surface, that seems to vibrate, and which causes dazzling, if one persists in tracing the design o composing it. All those that have attempted to draw grisailles in place have experienced that effect, while one can copy without fatigue a colored glass window. It was then sensible not to paint subjects in grisaille.

One can admit that the phenomenon of vibration produced by modeled glass, and thus the necessity of not having beside colored surfaces those entirely uncolored, caused glass painters to mingle colored strips in grisailles. That change made t them more easy to understand, outlined them more distinctly, and took from that shot effect, which became insupportable, if the windows occupied a great area. That was indeed when the glazed openings occupied all the space left between the piers and the side arches, that men renounced uncolored grisailles. The last panels that we have given, and which belonged to the cathedral of Troyes, occupy narrow windows without tracery; but when

it concerns wide openings with tracery, like those opened in our interiors after the middle of the 13 th century, the glass painters renounce the uncolored grisaille; they stripe it with red or blue strips, sprinkle it with rosettes and enclose it in colored borders. Among grisailles tha one can regard as o oldest are those that fill the windows with tracery in the apsidal chapel of the abbey church of S. Germer. The construction of that chapel followed slightly that of the S. Chapelle of the palace at Paris, i.e., it dates from the beginning of the second half of the 13 th century. Built at one spurt, its grisaille glass dates from the epoch of its construction, and already shows borders, some strips and scattered rosettes in colors. In the example (Fig. 43) the border is composed of saffron yellow leaves on a blue ground with an internal red strip. The four lobes R are uniformly red. In the example (Fig. 44) the b border consists of yellow fleurs-de-lis on a red ground without an inner colored strip, and the rosettes are formed of a green square enclosed by four red semicircles. [1] One will note that already in this grisaille the white strips are outlined by a lead on one side only, the other side being painted. This was a simplification of the procedure of the beginning of the 13 th century, but the general effect loses the amplitude and firmness of those first grisailles. The grounds are always a very fine lattice made with the brush. Yet at the end of the 13 th century, the strips of color become more numerous and the rosettes more important; the lattices of the ground are replaced by a quite unequal tone, a sort of glazing that has the inconvenience of coloring those bistre grounds, that takes from the delicacy of the grisailles. Among the most beautiful grisailles of that epoch, or of the beginning of the 14 th century, it is necessary to cite those of the cathedral of Narbonne. Here (F (Figs. 45, 46) are two of those varied panels. In the first the border is composed of painted yellow squares J, between w which are placed a blue and a red glass, B, R. For the body of the grisaille the rectangular strips are blue, the curved strips are red, the rosettes have yellow hearts, the circular trefoil is red and the angular trefoil is green, or the reverse. On the white glass, the painted ornament leaves between it and the colored strips a margin without grisaille, which very skilfully enhances the red and blue tones of the interlacings. The

drawing of this glass is to be mentioned. The width of the panel A X between the borders was divided into 6 parts. From each of those dividing points were drawn lines at 45°: the centres of the curves,: the curved as well as the straight strips, are found on that third diagonal. Thus the centres of the curves a b are found at the points c, etc. It is unnecessary to say, that a white strip encloses the border on the outside. In the second example (Fig. 46), the colors occupy a great part of the surface. The border consists of yellow **fleurs-de-lis** on a blue ground; then is placed in internal red strip. the shields of arms are of argent and the cross of gules; or parted in half; the first of argent with pattee cross of gules and or, charged by a tower of sable; the second of or with red stripes. Other shields decorate this glass; the first is detached on pearled yellow ground enclosed by two square crosses of vert and purple violet; the second is placed on a blue ground with squares of the same below, but with alternating tones. The effect of this grisaille is very beautiful; if indeed one can give the name of grisaille to glass, where colors occupy more than half the surface.

Note 1.p.455. Our Figs. are at quarter full size. These drawings were furnished to us by M. Boeswillwald, who directed the restoration of the S. Chapelle of S. Germer.

The cathedral of S. Nazaire of Carcassonne also preserves very remarkable grisailles of the beginning of the 14 th century, where color fills a very important part. Particularly in the two north and south rose windows, these grisailles are actual colored mosaics.

About the middle of the 14 th century, when men came to apply yellow by means of the salts of silver, they sometimes enhanced white grisailles by yellow touches. One sees pretty grisailles of that kind in the chapel of Vendome of the cathedral of Chartres. The storerooms of S. Denis also possess a very pretty panel, that has been reproduced by M. A. Gerente. It must be stated that this kind of grisaille is better suited for the openings of apartments than for the windows of great naves. This decorative means is too meagre to produce a distant effect on great translucent surfaces.

In the 15 th century the fashion of tapestry grisailles was lost and was replaced by sketches of architecture in which the yellow, with some colored figures of mediocre effect.

The 16 th century made many grisailles, or rather reliefs with subjects and arabesques, We do not think it necessary to return to what we have said on this procedure of painting on glass.

It is known that the Cistercians did not admit in their churches paintings and sculptused figures. Deprived of those means of decoration, those religious closed the windows of their churches by means of white glass arranged so as to form rich designs by the lead settings. From the year 1842 we have noted glass of this kind dating from the first years of the 13 th century in the abbey church of Pontigny, that depended on the order of Citeaux. Later in 1850 Abbe Texier mentioned glass of t this kind in the churches of Banlieu and of Obazine, [1] both C Cistercian. This uncolored glass dates from the 12 th century. The designs of the glass of the church of Banlieu is perhaps some years earlier than that of the church of Obazine, but otherwise the system adopted is the same in both monuments. These designs are well composed, broad aof of a beautiful character. One can judge of them by the example that we give here (Fig. 47), taken from the church of Bonlieu. On some points, remarks Abbe Texier, the leads do not enclose the glass, but are attached at only one side. [1] It was there only to complete the design a and to avoid too difficult cutting. Besides, this is an expedient rarely employed.

Note 1.p.258. Annales archaeologiques. Vol. X. p. 81 et seq.

Note 1.p.459. The non-enclosing leads are marked by a white line.

M. Ame has drawn a part of the white glass of the Cistercian church of Pontigny. Some of these glass windows nearly approach in design those of Obazine, but othess differ essentially from them and present partly combinations of straight lines. Here (Fig. 48) is one of those panels whose arrangement recalls that of the beautiful grisailles of the beginning of the 13 th century. [2] Once on that path, M. E. Ame discovered glass of this kind in a certain number of edifices of the department of Yonne, particularly in the churches of Megennes, of Chablis, and in the chapel of the old hispotal of Sens. We likewise in 1842 drew some in the little church of Montreal, which date from a much later epoch, the 15 th or 16 th century.

Note 2.p.459. Recherches sur les anciens vitraux incolores du department de l'Yonne, by M. E. Ame (Didron). 1854.

This system of glazing then was not only employed by the Cistercians, since the last edifices did not depend on that order. However, it must have been adopted when resouches were lacking to execute colored glass or painted grisailles. Since our attention was directed to this sort of glazing, we have discovered many fragments in churches of the 13 th, 14 th, 15 th and 16 th centuries; fragments that present infinite combinations. One still saw entire and varied panels of it in 1843 in the abbey church of Beaulieu near S. Antonin, that dated from the end of the 13 th century, and which then belonged to a farm. Here (Fig. 49) is one of those panels of an original design. The glass of these windows is not of a uniform white transparency, but is of unequal thickness, and is more or less greenish or yellowish, which adds to the effect of this sort of glazing. The setting in leads of this last example is very careful. In the upper part of our Fig. is indicated the mode of drawing, and the means of finding the centres of the quadrants composing the compartment.

It is not to be doubted that the glazing of the windows of habitations was composed thus in most cases, since the vignettes of manuscripts always show us white glass set in leads in varied compartments in the interiors of apartments. Frequently a heraldic shield figured at the middle of these white panels, in the glass windows of castles and palaces, or a device or emblem, giving some points of color to enliven the white surface of the great windows, without reducing the light necessary in every room serving for habitation.

Painting on glass certainly requires a very lengthy treatment, if one wished to make a complete history of it, and to indicate the different procedures employed by the various French schools, during the space of three or four centuries. In that study of this art or of this industry, if one prefers, recently renewed by some distinguished artists, there is a very extensive field of observation to be passed over. We can only indicate the salient points of thi study and remain within the limits of the Dictionnaire. Perhaps some will even find that we have extended at too great length on one of the parts of architectural decoration; but it seems to us that in that art of translucent decoration, there are resources that could be utilized in a wider manner, than is done in our days. In a climate like ours, where

the light of the sun is often veiled, where the interiors of edicifes and of habitations are only lighted by a dull light, it would be natural to seek to color that pale light. There would be the feeling of the clorist. We have allowed this feeling to be stifled under a classicism of narrow views, pretentious in its expressions, which does not demand that one should understand, but should admire confidently what it allows in art. Certainly, a long experience and serious studies are necessary to recover the neglected traces of this industry of the glass painter.

Some devoted men have made considerable efforts and sacrifices in our days to recover those traces. They have even opened for our country a source of very rich production; but being badly seconded by glass manufacturers, who do not occupy themselves with the conditions essential to translucent coloring; obliged to struggle against a competition of cheap products, that depreciate this beautiful art in the eyes of men of taste; systematically repulsed from the great public works by powerful groups, it is with great difficulty that they keep their shops open. However, they are not discouraged; their industry must find a good place in a time when architecture tends more and more to erect vast and well lighted edifices; but they should use the leisure given them by a systematic opposition to know the true resources of this decorative art in particular. When the day of reaction against academic mediocrity arrives, they will be ready.

VOIRIE. Public Streets and Ways.

Under the feudal regime, the roads and ways belonged to the lord on whose land were opened these public ways. The lord had the right of changing the direction of those ways and of receiving the tolls intended for their maintenance. In the cities the public streets belonged either to the municipality, the s sovereign, or to the lord possessing the feudal rights.

At Paris before the 13 th century, the public streets belonged only to the king and the bishop within his jurisdiction. Only after the reign of Philip August the control of the public streets parsed into the hands of the provost.

In most cities of Languedoc, which had retained nearly intact their Roman municipal forms, the rule of the public streets be-

belonged to the consuls, who then policed the streets and places. Frequently the policing of the streets belonged in common to two powers in the same city. This policing consisted in preventing the making of cellars beneath the streets, the establishment of broad flights of steps that might obstruct passage, projections of hoods injuring passers or neighbors, and the de deposit of sewage there. Inspectors looked after the maintenance of the paving and the discharge of water, the repair of common wells and fountains, and the maintenance of chains. One will understand how the control of the public streets was often divide among several lords in the same locality, and was the occasion of numerous conflicts. The Olim indeed contains a good number of decrees made concerning those disputes. We give here one of those decrees dating from 1312, which clearly explains the nature of the conflicts and how they were decided by the king's court. (Old French text). [1]

Note 1.p.464. The Olim, published by count Beugnot. Vol. II. p. 581. Collection of unpublished documents on the history of France. Series I.

It results from the tenor of this decree, that in spite of the claims of the abbot of S. Riquier to possess feudal rights over the city, the inhabitants could repair the houses on the public streets and places of the said city, on warning the inspector of the abbey, except in case of a major force, such as the ruin of a wall, of a house, [2] or the curb of a well, in which case the inhabitants could proceed at once to rebuild without prelimary notice. In any case the notice given to the inspector is useless, when it concerned repairing the defenses of the city. Thus the royal power, without entirely distroying the rights of the feudal lords, actually annulled them by limiting these rights to a simple declaration made to the feudal inspector, a declaration that could not be followed by opposition to the declared repairs. As for the walls of the city, regarded by the sovereign as belonging to him, if he had need to repair them, it was not even necessary to notify the inspector of the lord possessing feudal rights over the lands of the city. Only gradually the royal power thus succeeded in taking possession of the control of public roads and the streets of cities, and the ordinances of the kings of France after the 13 th century are full of decisions, that tend to centralize questions of

public roads in the hands of the sovereign. Before that epoch the post of inspector is created in the cities made communes by the lord granting the charter. For example, at Auxerre in 1194 the charter of the count of Nevers, who instituted the commune, created the post of inspector and fixed his jurisdiction. [2] All the disputes referred to the king's court generally produced a decree, that might be regarded as an infringement by the sovereign of the feudal rights or those of the communes.

Note 2.p.464. Baluze, Miscell. VII. 326.

VOLET. Shutter. Blind.

A solid wooden shutter of a window, placed inside or outside. (Art. Menuiserie).

VOUSSOIR. Voussoir. (Art. Claveau).

VOUSSURE. Arch. Archivolt.

Rows of voussoirs of archivolts that enclose the tympanum of a doorway. (Art. Porte). The name of cavetto is also given today to the curved surfaces forming the transition between the walls of a hall and the ceiling; but this kind of construction was not adopted during the middle ages; it only dates from the end of the 16 th century.

VOUTE. Vault.

In Art. Construction we have explained in a general manner, how from the system adopted by the Romans for vaulting their edifices, the architects of the middle ages had arrived at e entirely novel combinations of vaults lending themselves to all plans. We do not here have to return to what that Article contains, to the means employed to resist the thrust of vaults, but to develop the various procedures adopted in France from the 11 th to the 16 th centuries for drawing these vaults, and establishing them on their supports.

At first one fact must fix the attention of the observer, that examines the vaults constructed by the Romans under the empire; this is the economy applied in the construction of those vaults. However great builders they were, the Romans brought into their works principles of economy, that we cannot meditate on too m much. Now since it here concerns vaults, no one is ignorant that

the causes of perhaps the most important expenses in the construction of vaults are the wooden centerings, that are necessary to support them till the moment when they are closed, and when they can support themselves by the complete juxtaposition of the materials composing them. When one examines some of those great vaulted Roman edifices, like the Baths of Antonine Caracalla, of Diocletian, the basilica of Constantine at Rome, etc., one is at first disposed to believe, that there was necessary an enormous volume of wood for forming those vast concrete structures, centerings of prodigious strength; consequently considerable lost preliminary expenses. Yet a more careful study of these vaults soon causes it to be recognized, that on the contrary, those constructors being practical first of all, knew how to enclose those enormous concrete structures by the aid of economical and very simple means. If one takes the trouble to analyze these wide Roman tunnel and cross vaults, and domes, he finds that these curved surfaces, apparently uniform and homogeneous, are formed of a series of ribs and e even cells of bricks, whose intervals are filled by a concrete composed of light stones and mortar. Thus to close a very large vault, it sufficed to place a certain number of carpentry centres, relatively limited and of moderate strength, and to connect them by a plank form on which the vault was constructed, as we shall see.

It even occurred, that not to place on the light carpentry centres a pressure that they could not resist, the constructors formed the principal ribs of rows of bricks superposed, the first serving as a permanent centering for those succeeding and thus relieving the temporary carpentry centering. The constructor even frequently turned on centres quite far apart and only connected by planks, a vault of large bricks laid flat, a vault that had but in insignificant weight, and on that vault or light shell, already very resistant, he formed the principal ribs and the cells of bricks, filling the intervals with concrete.

Our Fig. 1 will explain this method of constructing vaults. Let a tunnel vault be erected. Light centres of carpentry A are raised and set at equal distances, their curves commencing at the level of the part of the vault already erected without the aid of centering, but by t e help of a simple wooden radius rod or of curves. These centres are connected by planks or

lagging B, that it is not necessary to lay close, planks sufficiently thick as not to bend under the weight of a man. On these planks the masons have laid the covering C of great flat (square), bricks, just as are built in our days vaults of tiles or square slabs of terra cotta, cement or plaster. [1] Henceforth the workmen operate on a solid shell, homogeneous and able to resist a load. The ribs D are set over each centre and are made of great square bricks. These ribs have been arranged as indicated by the detail X with double bricks a b at certain distances, so as to be able to set in the groove between them planks P normal to the curve. On these planks regarded as supports, have b been set the purlins E with great bricks with broken joints. After the setting of the mortar holding the bricks of these purlins, the planks are removed, and then the empty cells remaining were filled with a concrete of tufa or pumice stone and mortar. It is evident that if from the level V the masons had turned a vault of 15.7 to 19.7 ins. thick in bricks or rubble by the ordinary procedure, i.e., by gradually carrying up the rows of voussoirs from this level V of the crown, very strong centres of carpentry and lagging would have been necessary; for having reached the level V of the vault, the pressure of the structure on the centering would have been very considerable, and as great on the lagging as on the centres themselves. Further the carpentry centres shrink and always yield a little in their connections, retaining their curvature for several weeks with difficulty, if they are cut for a great diameter. The shell C must be set very rapidly, and of itself forms a centering, and the carpentry centres under this shell could dry and be deformed without inconvenience. They were longer kept in place with their centering, only as an excess of precaution. There are still seen traces of this tiling, single or double, in many Roman vaults. [2] It received the internal coatings that adhered to its surface by means of joints of plaster or mortar, that connected the bricks laid flat. If the vault was a cross vault, the system employed was the same, and the diagonal arches marked the intersections of the half cylinders. Those diagonal arches (Fig. 2), could not be set at the same time in the two curved surfaces, which have a right angle only at the springing of the groin. In fact when two half cylinders intersect at a right angle, it is known that the angle of the junction of the

curves becomes more obtuse as one approaches the top or crown of the vault. A brick arch cannot be moulded in that form, since there would be required as many different angles as there were bricks in one branch of the arch. The Roman constructors then set the diagonal carpentry centres according to the true line of intersection, then placing on the curve of the centres wooden forms b (see A), leaving at certain distances between them intervals c and of less depth as they approached the top of the arch. On these forms the mason then se the diagonal arch perpendicular to the diagonal plane (see B). The section of this arch is represented by the square e f g h, the forms filling t the space i j, and the centre being k. In the intervals c were set double cut bricks, as indicated by the trapezoids o p q r, their edges according to the horizontal direction of the two cylinders. Thus are obtained the construction indicated at E. Two rows of bricks parallel to the surfaces of the vaults permitted placing at l the planks (as shown in the preceding example), which allowed the setting of the purlins m in which was placed the concrete filling. The projections of bricks spread parallel to the surfaces of the vaults served to trace and preserve the groin, made at the same time as the plastering. If this concerned a dome, where these brick ribs formed arches engaged in a portion of a sphere, as one can see in the vault of the so-called temple of Minerva Medica at Rome, where these ribs form a series of imbricated arches, as in the vault of the little round hall of the Baths of Diocletian.

Note 1.p.467. Plaster was employed by the Romans in the circumstances indicated here, notably at the theatre of Taormina in Sicily, and in the Baths of Antonine Caracalla at Rome.

Note 2.p.467. Notably on the vaults of the Baths of Antonine Caracalla.

This construction of vaults then presented the following advantages:- 1, economy of centering; 2, rapidity of execution, yet without having to fear accidents resulting from momentary interruption of the work; 3, facility in employing workmen of different qualities; for to fill the cells with concrete only required laborers; 4, the possibility of removing the centering immediately after filling the cells, and even before that filling, if one had to employ the centering elsewhere, since the shell composed of bricks laid flat more than sufficed to

receive the fillings of the cells; - 5, elasticity during the d duration of the work, which allowed the avoidance of ruptures, that manifested themselves in a structure absolutely homogeneous, and that required a certain time for completion; 6, after filling the groins, a perfect connection. In the construction of very large vaults, that even by their extent could not be closed in a brief space of time, there frequently appeared ruptures during the work or immediately after its completion. Those accidents occurred during the construction of the dome of S. Sophia of Constantinople in such a serious manner, that it was necessary to commence the work again; but the Romans of the late time no longer knew how to build like their ancestors. After the construction of the dome of S. Peter af Rome appeared cracks. It is easy to conceive who curved surfaces of that extent, built slowly, after the completion of the work, present parts perfectly dry and set, others being still soft, so to speak, or at least slightly compressible. To that inequality in the setting of mortar, and consequently in the compressibility of these surfaces, must be attributed the disorders found in the great masonry vaults erected since the good epochs of the empire. But if instead of erecting those vaults in courses and by zones, as still done in our days, a skeleton were rapidly built in accordance with the form of the vault itself and its curvature, which is easy, one could take all the time necessary to fill the intervals left in that skeleton; for that being established the vault is built, it takes its equilibrium, suffers settlements without stress or rupture. This method must very naturally lead Roman constructors to adopt caissons for their vaults, particularly for spherical vaults. Let us see why. To build a spherical vault, it is necessary to establish radiating centres dividing the sphere by arcs, just as degrees of longitude divide the earth; but since the lagging from one centre to another produces straight lines, it resulted either that the vault was composed of a series of planes, or that it was necessary to build a form on this lagging to arrive at the spherical curve. That required mulh wood, was lengthy and consequently was expensive. More serious difficulties arose of the spherical vault had a very great diameter, like that of the Pantheon at Rome, for example. [1] Assuming that one desired to erect a vault covering as great ar area by the method adopted in mod-

modern times, i.e., by zones of masonry successively built on centerings, one understands what strength it would be necessary to give to those centres, and how it would have been essential to ensure their perfect immobility during a very considerable time; now the wood shrinks in such great volume, and considering the number of its connections, is deformed, so that in spite of all precautions, a centering of this emportance would perhaps sink at its top 20 ins. at the end of 3 or 4 months. So much is not necessary to compromise the erection of the dome of that dimensions. But if on a relatively light centering, the constructors could in very little time erect a light skeleton, yet sufficiently resistant to allow the completion of the construction of an enormous hemisphere, without haste and without fearing settlements or partial deflections, the problem would be solved, and one would run no risk, for the removal of the centering of the vault would be reduced to the removal of wooden timbers, whose functions had become insignificant; this could be done without taking very careful precautions, without which a catastrophe might occur. In structures it should never be forgotten that the lack of precaution or of skill could not occasion a disaster; the practical procedures must offer all security, and nothing should be left to hazard or to a more or less happy chance. In that manner evidently, the Roman architects understood how to erect their structures.

Note 1.p.470. The vault of the Pantheon of Agrippa is 142.26 ft. in diameter.

Piranesi has given an engraving of the construction of the dome of the Pantheon of Rome; but we do not know on what basis he made that place, for in his time, no more than today, could one accurately recognize the construction. We think that the system that he indicates as that of the extrados of the dome, that he might have seen when the lead covering was repaired; he would have assumed that the combination visible on the exterior must be reproduced in the interior; now that is not possible, if one considers the arrangement of this interior and t the thickness of the vault, which is not less than 4.92 ft. near the lunette. The bricks that one can see on the extrados certainly do not extend through the thickness of the vault; then the structure, the visible framework in the interior can be different from that visible on the exterior. We will go farther, and

will say that those two skeletons must be absolutely different, and we shall explain why. When the Romans built a transverse arch, the head of a tunnel vault supporting a load, or even a relieving arch, they took,care to proceed as indicated by Fig. 3 at A; they laid up from the springing about a quarter of the arch in rows of bonded bricks; then the two quarters remaining in rowlock brick arches. Since they built the relieving arches before the fillings that these arches were required to relieve, centres were necessary for those arches. The system of rowlock arches allowed them to not load beyond measure the carpentry centre at its weakest point, since they commenced by setting t the first row of voussoirs D E. This row being set, the centre had nothing more to bear, and they could turn the other two arches. Yet if the Roman constructors had only the intention not to load the carpentry centre from the moment that the first arch had been turned, they would have built the rest of the arch with bonded bricks, using the first arch as a quite sufficiently resisting centre; but on the contrary, we see without exception the upper part of the transverse or relieving arches are built in rows of rowlock bricks. This method was justified by experience. If we assume the arch A (relieving arch of the external wall of the Pantheon of Rome) built entirely of banded bricks, as sketched at B, and that the piers F and G spread apart because of some movement, for example an earthquake or settlement, this arch will break in the extrados at H and at I in the intrados; all the pressures will then act on the two angles K and the corner L, and if the load be great, these will crack, so that the segment K K will no longer support it. But if this relieving arch had been constructed like those of the Pantheon (see A), and the spreading of the piers had occurred (see C), the three rowlock arches would bend and open, and the loads wo would be divided between 6 angles of the intrados at M and 3 angles of the extrados at N, at the crown. The angles of the ruptures would be shorter, and the disorder would be much less than in example B. One then understands why these brick arches are always rowlock arches in their upper part, i.e., in the part bearing the load; this was to retain a certain elasticity, that arches homogeneous in their depth could not have. This p principle is based on observation, so simple also, but so little followed in modern architecture, for a stronger reason, was

applied to domes of great diameter.

Conformably to the method explained in Fig. 1 and by reasons given above, it was necessary for a dome like that of the Pantheon to be rapidly blocked out on the centering, so to speak, that the Romans adhered to making light and short timbers as much as possible, in order to avoid useless expenses, difficulties in setting, and the waste of carpentry. To clearly explain the method of the Roman constructors, when they desired to erect great domes, we will take as a type the Pantheon of Rome. Fig. 4 presents a section of that hemispherical vault. The external wall with its relieving chambers so skilfully combined, has been built up to the level N with the beginning of the vault, divided by 28 coffers in its circumference, leaving between them 28 solid piers, that lose themselves in the solid p portion of the calotte comprised between the point a and the e eye L. These 28 piers indicate the places of the carpentry centres C abutting against a frame of carpentry composed of 28 p posts and two strong rings. We assume these centres to be made of short timbers and according to the system of Roman carpentry reproduced in the reliefs of the column of Trajan. Except by means of a prodigious expense, one could not think of placing centres resting on the ground and with ties. This system of centering is further still used at Rome and a part of Italy a and is solid, but cannot support a very heavy load. The 28 half transverse centres being set, it was necessary to connect them by cross timbers and to form the centering to receive a masonry vault. If the constructors had claimed to close in this carpentry a calotte like that with the given section, it is evident that the centering would have been deformed by the load as soon as the masons reached the point P, for on such a great s surface it was not possible to construct at the same time an entire zone of the dome. Certain points would be accidentally loaded more than others, from which could result immediate d disorder. One sees at A one eighth of the horizontal plan of this system of centering. In section the coffers are so profiled that their edges are all visible from the centre of the pavement of the edifice; i.e., (see at B the detail of the section of one of the coffers of the second zone), the eye of the observer being placed at the centre of the edifice on the pavement perceived the entire depths of those edges, which tend to

this point of sight. The centering being thus arranged, it was necessary to find the quickest and most economical method for building that enormous dome. The details of that operation are explained in Fig. 5. At A are the centres. To connect the curves and to place purlins, ties a have been nailed on the sides, as one would do for lintels. These ties each had two gains that received the purlins E, that were notched at e to receive the additional centres c. Sheathing P rested in a rebate and connected the two purlins. There remain the open frames F to be closed. Now the skeleton of the carpentry so combined being perfectly stable and as light as possible, indicates the work incumbent on the masons. They profited by the wooden members for setting their brick ribs; it was useless to fill the spaces between the ribs with solid masonry. On the contrary, this was a case to profit by these spaces F left between the members to lighten this masonry. Then instead of closing those voids by ordinary lagging on the frame composed of purlins and extra curves, they placed another projecting frame g, on which was a second projecting frame h, and a third i, then a panel of planks, each being smaller. In section these three frames and the panel gave the profile indicated at R in Fig. 4; thus they found the mould for the coffer indicated on the centering. The masons could then execute their work very rapidly, as indicated by the sketch B in Fig. 5. They turned on the centres the brick ribs G, connected at the purlins by the brick shores H, also slightly curved and set on a wooden centre removed as soon ar the arch was turned. This brick skeleton repeated accurately the wooden framework, leaving the coffers visible, on which it was only necessary to place a concrete of light materials and mortar (see at S). It is clear that the panels V of this concrete were much thinner than the depth on the framework. This concrete in cells then formed as many little compartments comprised between the longitudinal ribs and the zonal bands of brick. This first operation could be rapidly completed and formed a very resistant shell, well balanced but light, and that thenceforth made the wooden centering superfluous. That might dry and open in its joints without resulting in the least disorder. But a hemispherical vault of this extent and about 1.6 ft. thick at the ribs could not offer serious guarantees of durability for constructors, that claimed to leave nothing to the chances of accident,

such as a hurricane, a great atmospheric pressure, an oscillation of the ground (from which Rome was not exempt). It was n necessary for this framework of relatively thin ribs to be preserved, enclosed and held by a protecting shell. The hemispherical calotte being made even externally by concrete, or rather by coarse plastering, the constructors sought the means mose suitable for ensuring this light and fragile shell. Thus they must have adopted the system seen by Piranesi, a system explained in Fig. 6. Of all the great domes known and still entire, that of the Pantheon of Agrippa is the only one not cracked. That of S. Sophia was restored on several occasions; that of S. Peter of Rome is cracked in a very serious manner. 1 Then we believe it is due to this double system, that the dome of the Pantheon of Rome must be preserved intact, in spite of terrestrial movements, that on several occasions caused accidents to certain edifices of this city. We have not been able to verify the fact of this framework of arches doubling the dome with coffers; the indications of Piranesi can alone supply information. But certain arrangements of the drum of the edifice leaves little doubt to us in that respect. In fact if one glances at Fig. 4, he sees that this drum (see the eighth of the plan at A) presents a series of solid and void parts, that coincide with the points of support of the lower niches forming chapels today. Knowing that the Romans in their structures do nothing without a motive, one could not understand why the buttresses T were reserved, unless they contributed in some efficient way to support the dome. These buttresses T are not arranged at the ribs of the coffers; they have a distinct function, explained by the outer framework represented in Fig. 6. To form this the dome with coffers served as a centering, and light centres of wood sufficed for turning the arches resting on the extrados of that dome. After these arches were turned, it only remained to fill the intervals with a concrete of light materials, as indicated at P in Fig. 6.

Note 1.p.478. It is necessary to state that these two domes are erected on pendentives; but the nature of the cracks produced in the dome of S. Peter does not indicate that these disorders are only due to settlements. There are ruptures in the dome itself caused by a slight elevation of the zone of the haunches of the dome. The ruptures produced by settlements, on the cont-

contrary, are produced (and that must be so) at the base itself of the hemisphere, which is the motive for placing a circle of iron at that base; these cracks are according to the meridian lines. The cracks seen on the extrados of the zone below the lantern are according to the horizontal circles, and produce a pressure on the intrados, that causes the separation of pieces of plastering and of mosaics.

The economy of centering occupied the Roman constructors so much, that even when they made vaults of cut stone and of sufficiently great size (which is rare), as for example in the monument of Nimes known under the name of baths of Diana, they set transverse arches on centres, and those transverse arches themselves served as centres for setting great slabs on them as one places lagging. Our Fig. 7 explains that system of construction of vaults. In this last case, the constructors saved all wooden centering, since the thick slabs of stone have each end resting on the transverse arches. Then it is evident, that in the construction of their vaults the Romans economized as much as they could, both material and time, and consequently never incurred useless expenses. One can scarcely cite one or two c examples of cross vaults with cut sections in all the edifices of antique Rome. By this same mo ive of economy they avoided penetrations, back-arches, masonry pendentives, and which our modern architects show them so lavishly, when they claim to have studied antique architecture to derive benefit from it, to the great damage of our finances. [1]

Note 1.p.477. M. Choisy, a young French engineer will soon publish a very complete work on the structure of Roman vaults, from the monuments. This collection, that we have had in our hands, gives in detail the various procedures employed by the great constructors, and demonstrates in the most evident manner, that economy in expenditure was one of their principal cares. We advise architects that seriously desire to know the procedures employed by the Romans in construction, to refer to the works of M. Choisy on this matter.

We must extend a little on the system of construction of Roman vaults to show certain analogies between this system and that adopted in France about the middle of the 12 th century. Analogies in principles, as will be seen, and not in forms: which proves again that true principles established on correct

and logical observation, are not a restraint in the art of architecture, but on the contrary is the sole producing force.

Already at the end of the empire, these methods employed in the construction of vaults were changed; the constructors neglected the opportunity to regularly apply the procedures accepted in Roman edifices until the Antonines. At Byzantium the great vaults of the church of S. Sophia are rudely constructed. It is unnecessary to state that during the first centuries of the middle ages, the last traces of those traditions of the good Roman epoch were effaced. Men sought to reproduce in small dimensions the visible forms of Roman vaults, but no longer knew their actual construction. It was only at the beginning of the 12 th century, that a sudden advance in the construction of vaults manifested itself, and there appeared the embryo of a new system in the West. This phenomenon occurring at the moment of the first crusades, it was very natural to attribute this abrupt development to oriental influence; but the documents that could be collected up to the last years scarcely confirmed these assumed conjectures, when count Melchior de Vogue undertook a journey in central Syria. Accompanied by a young architect, a skilful draftsman, M. Duthoit, count de Vogue brought from those provinces a mass of documents of high importance for the history of our French art, for they give us the explanation of the progress, that manifested itself so rapidly in the West from the first years of the 12 th century. [1] In fact these monuments of central Syria due to a Greco-Roman civilization present a special character. In their construction the Greek and Roman elements are not placed beside each other, as it occurred in the edifices of imperial Rome; they combine under the clear and logical mind of the Greek. We have emphasized many times this singular arrangement of the Roman architecture of the empire, [1] which only regarded Greek art as a sort of decoration independent of the structure; so much so that in every Roman edifice, one could remove that ornamentation borrowed from Greek art without affecting the organism, so to speak, of Roman architecture.

Note 1.p.479. See Syrie centrale; civil and religious architecture from 1 st to 7 th centuries, by count Melchior de Vogue. Baudry. publisher.

Note 1.p.480. See Entretiens sur l'architecture.

The Greco-Roman edifices of central Syria proceed quite differently; the two Greek and Roman constructions lend a mutual a assistance; there is no longer a skeleton and the vestment covering it, but a body complete in all its parts. The arch and the lintel are no longer combined in spite of their properties, as seen so frequently in the architecture of the empire, but f fulfil their actual functions. This rationalism in the art evidently exerted an influence on the western peoples, who threw themselves in compact masse into those provinces at the end of the 11 th century. It was no longer to follow afar the weakened traditions of imperial art; the crusaders found in the cities already abandoned but still standing in the Hauran, an architecture new to them, clear in ets expressions as a lesson well learned, fertile in deductions, easy to understand, and that could be adopted to every need.

The cross vault does not exist in those edifices, all being built of jointed masonry, but indeed only the tunnel vault, the dome and half dome. Transverse and archivolts are frequent, and these transverse arches that form bays support either ceilings of stone or of carpentry, according as the localities have or do not possess wood.

We shall examine why these arrangements must have had a direct influence on the construction of our western vaults, and c caused the abandoning of the mode of construction of the Romans. Here (Fig. 3) is a fragment of the basilica of Chagga, [2] whose erection dates from the 3 nd or 3 rd century of our era. The bays of this basilica are narrow (8.2 ft. on centres of piers) and are covered by thick slabs between the transverse arches; a layer of tamped earth covered with a coating formed the tight terrace on the upper slabs. The construction consists of p piers of square section bearing transverse arches over the principal nave, abutted by other transverse arches turned over the side aisles, which sustain a gallery in the second story looking into that central nave. The character peculiar to this construction are the transverse arches composing the internal skeleton of the edifice. Nothing similar in the western Roman structures of the empire. The Roman vault of masonry as just shown at the beginning of this Article, rarely possesses visible transverse arches, [1] since these arches are imbedded in the thickness of the vault itself and are only concealed ribs.

Note 2.p.480. See Syrie centrale.

Note 1.p.481. The example of the temple of Diana at Nimes is an exception. It must not be lost from view, that the Roman monuments erected in Provence are perme.ted by the Greek spirit, far more than those of Italy, particularly in approaching Marseilles. It is interesting to verify the analogies existing between those antique monuments and of Roman Provence and those of central Syria.

For western architecture, so greatly impeded at that epoch, when they attempted to establish vaults on the plan of the Roman basilica (Art. Architecture religieuse), the sight of an edifice like the basilica of Chagga, -- central Syria still possesses several conformed to these arrangements, -- must bring forth the idea of applying this mode of construction, while replacing the terraces, suitable neither to the climates of the West nor to the nature of the materials at their disposal, by a tunnel vault over the middle aisle, by cross vaults over the side aisles, and by a half tunnel vault over the gallery to permit the establishment of inflined roofs and to abut the c central tunnel vault. These deductions naturally presented themselves to the minds of the western constructors, however unsophisticated they may be supposed.

The section of the basilica at Chagga (Fig. 9) gives the sketch A; two bays of the plan are projected at a. Subjected to thenecessity of covering their edifices by slopes sufficiently steep to receive tiles, and not being able consequently to employ the system of terraces of the Syrian architects, the western artists desiring to apply the very simple principle of those basilicas, only had to raise the great transverse arches of the nave, as indicated at C in section B, to connect these transverse arches by a tunnel vault concentric with their extrados, to turn a half tunnel vault D over the gallery between the transverse arches E, and according to the Byzantine mode,[1] cross vaults between the lower transverse arches of the side aisles. The substitution of vaults for terraces necessarily forced the piers P apart. The archivolts F and other archivolts I, or an opening looking into the central tunnel vault. But the archivolt G intended to receive the vaults of the side aisles advanced to the inner faces of the piers P, and then to support the upper transverse arches C, it was necessary to add to these

piers a projection L in the form of an engaged column. From a structure in which the arch and the lintel were simultaneously employed with an exquisite feeling of truth, the western architects without too much trouble came to build a monument entirely vaulted. Still this modification, apparently so simple, raised difficulties in detail, that were only gradually solved. Yet such is the power of clear and logical primary instruction, that all labor involved was done under that primary influence. The western instructors, in seeing that Greek architecture of Syria, learned to reason; thus from that epoch their works, previously so confused and full of traditions badly understood, reproducing and corrupting more and more the forms of Roman antiquity, arose and advanced by relying on reasoning, in these principles left by the last of the Greeks.

Note 1.p.483. We shall soon explain in what consists this mode.

This section B is that of most of our Romanesque churches b built at the beginning of the 12 th century in Auvergne, Languedoc, Provence and Lyonnais. One can easily verify that there is less difference between section A and section B, than between any vaulted monument of Rome and that section B. This round t transverse arch E of the gallery, that one finds again in the galleries of the Romanesque basilicas of Auvergne and of Languedoc, and cannot be explained with the half tunnel vault (Art. Triforium), is a vestige remaining from that influence of the Syrian monument. As for the differences in detail just mentioned, let us first see in what they consist. The piers of the basilica of Chagga (see at a) are square in section, which was natural, since those piers only received two transverse arches, and that the archivolt connecting those piers starts as a penetration a above the springing of the two transverse arches (Fig. 8). But we see that already in section B the archivolts G that connect the piers have their springings at the level of the springings of the transverse arches F (Fig. 9). The extrados of these archivolts G is only disengaged above that impost, and consequently the springing of the cross vault could only be established on a point raised above that separation, which is indicated in the perspective sketch (Fig. 10). There ss an embarrassment, one of those difficulties in detail in the art of construction, that soon compels him to find a satisfactory solution, however little he reasons; now all those who have practised that art,

and who are not satisfied with almost right, who desire to find the true solution, know how these sections lead one to modify certain forms, that seem consecrated by time. And it is precisely in the manner of solving these difficulties dating from the first years of the 12 th century, that one recognizes the power of that logical instruction, found in the Orient by our French masters of that epoch. At first those masters reasoned thus:-- since two transverse arches and two archivolts spring from the same leve,, and that between those transveese arches and archivolts (on their extrados) it is necessary to start cross vaults, it is absolutely necessary for the pier to have exactly the sections of the voussoirs of those arches, so that they find their places on it, and consequently the square section does not suit that pier; then they draw the pier H (Fig. 9). Thus the transverse arches find their bearing at d, the archivolts at b, and the groins of the vaults spring in the reentrant angles e, that are the points of the intersection of the e extradoses of those arches. But soon, when the vaulted monuments became greater, these architects recognized tha the archivolts supported the side walls of the tunnel vault, and must have greater thickness than the transverse arches that are not loaded, that these springings of cross vaults in the angles require either a special jointing, or reduce the pier by reducing the load; then they draw the piers according to the plan K. The archivolts are separate at f, the transverse arches of the side aisle at o; the angles to receive the springings of the cross vault; the angles i, the relieving archivolts over the opening of the gallery, and the great transverse arch of the central tunnel vault, having the width m m, rests on the abacus a of a capital resting on an engaged column. But the archivolt f of the transverse arch g has a thickness greater than the space o p, from which it results that the groin m of the vault must rise vertically until the depth r p of the voussoirs is separated from the groin; then the constructors add also an engaged column to the front of the pilasters of the archivolts and to the rear transverse arch, so as to advance the voussoirs of these arches in a manner to disengage them entirely from their springing. Thus is gradually composed the Romanesque pier of the 12 th century, required by the deductions derived from the construction of vaults.

While men did not have under their eyes those monuments of central Syria, it was difficult for them to render an account of the motives, that caused the adoption during the last part of the Romanesque period, of these transverse arches separating the bays of vaulted edifices, since the Romans did not separate the bays of their vaults by transverse arches. The Syrian edifices give us the solution of that question. In those edifices, by a series of very correct reasoning, the transverse arches are made for spans too great to be covered by lintels, or by carpentry in a country where wood was rare for a long time; those arches support great terraces as in the preceding example, or purlins. This causes us to say that those Syrian artists knew better than the Romans, how to combine the arch and the lintel. Western architects have retained the transverse arches as the natural skeleton of every edifice built of stone; only between those arches they have turned vaults according to the Roman tradition, either tunnel or cross vaults.

But in S. Sophia at Byzantium, the Roman cross vault was already modified. Its central crown was then habitually placed above the level of the extrados of the crowns of the transverse arches (Fig. 11), if indeed one could give the name of transverse arches to arches scarcely projecting from the external surface of the vault. For example, the arch A of Fig. 11 was only the Roman brick rib, which instead of being entirely imbedded in the thickness of the vault, projected a little. One will further note that these arches A, B, C, are flush with the vault at its springing at D on the square abacuses of the capitals, and only emphasize their projection in approaching the crown. In brief, those arches are not concentric with the vault, which is a sort of compromise between the dome and the cross vault. Now this is the principle of construction generally adopted by our western architects in the construction of their cross vaults at the end of the 11 th century; according to this system were made the vaults of the nave of the abbey church of Vezelay, which date from the first years of the 12 th century, and not without reason was this method adopted. These swelled vaults offered more resistance than vaults generated by two cylinders intersecting at a right angle. We developed all concerning this question in Art. Construction, and it is not necessary to return to this subject here, the more because at the beginning of the

12 th century, men did not apply the care in the practice of b building, that the Romans had known how to employ. They no longer made those fine large square bricks, that allowed the imbedding of strong ribs in the thickness of vaults and to obtain well bonded groins; built of tufa or of irregular rubble, very rarely of roughed rubble, the groins offered no cohesion and tended to separate. The more nearly the constructor approached the dome, the more he avoided the chances of rupture of the groins, since those scarcely formed a projection from the intrados of about half their depth, to lose themselves in an ellipsoid in approaching the crown. Besides, to trace the diagonal carpentry centerings, there was no need of seeking the curve of the intersection of the two cylinders, but it sufficed to draw a semicircle with a diameter equal to the diagonal of the parallellogram to be vaulted. [1] On these diagonal arches and on the extradoses of the transverse and side arches was placed the lagging, and then with earth was made the swelled form necessary for each triangle, so as to approach a dome more or less. They then built the masonry on this mould, without the necessity for making a special arrangement for the groins, only apparent at the springings and invisible at the crown. This sort of vault has the appearance internally presented in our Fig. 12, and the entire curved surface comprised between the points A, B, C, D, was either a spheroid if the vault was built on a square p plan, or an ellipsoid if it was on a rectangular plan.

Note 1.p.487. All this theory is developed in Art. Construction.

But before entering into any developments of this subject, it is necessary to make known the experiments that preceded and produced the revolution, that occurred in the art of constructing vaults at the middle of the 12 th century.

We have stated that the Romans avoided as much as possible t the penetration of tunnel vaults, as presenting difficulties and loss of time for the constructor. In fact the Romans, and this results from the study of their monuments, -- sought to e economize time, i.e., while building so as to ensure perfect stability and a long duration for their structures, they claimed to obtain a result in the shortest time. Then they avoided the jointing of masonry requiring complex drawings and lengthy stonecutting. If they had a tunnel vault penetrating a vaulted hall, they kept the crown of this tunnel vault below the springing

of the tunnel vault must be penetrated. For example (Fig. 13), let a gallery A have a tunnel vault; the tunnel vault of the g gallery B communicating with the former was turned, its crown C being below the springing of the tunnel vault D. The Coliseum at Rome, the amphitheatres at Arles and Nimes, present that construction at every step. But again when the voussoirs are cut in stone, instead of being bonded and set side by side, as shown by our Fig. This system of jointing is visible, not only in the amphitheatres of Arles and of Nimes, but also in the aqueduct Pont du Gard, and in many other edifices of the empire. It is clear that this method economized the time and cost; for there was only required a template for the stonecutters and at each joint a carpentry centre, instead of lagging on centres. In t this case the setting proceeds much more rapidly, than when the joints of the voussoirs are bonded. The architects of the middle ages sometimes used this procedure, notably in Provence, w where they had under their eyes examples of antiquity; but the plans that they adopted for certain parts of the edifices, like the side aisles surrounding the sanctuaries, side aisles into which chapels opened, required annular tunnel vaults intersected normally by other tunnel vaults. There was a real difficulty for the solution of which men could not resort to Roman structures, that do not present examples of this kind of vaults. The Byzantines had attempted to construct vaults resting on columns and forming intersections of cylinders, cones or ellipsoids; but it must be recognized that these attempts are rude, proceeding only by experiments, and do not give as a result a general method that can be formulated. In spite of the difficulties caused in the construction of the vaults of a side aisle extending around a sanctuary resting on columns, in starting from the Roman or Byzantine principle, it is to be believed that men strongly adhered to this arrangement of the plan, for western architects did not cease to seek the solution of this problem, from the beginning of the 12 th c century until it was completely solved at the end of that century. It must even be recognized that this long series of attempts in no small degree contributed to develop the system from which proceeds the cross vault of the 13 th century; an excellent system, since it allows all imaginable combinations while always employing only the same procedure.

To cause to be appreciated the progressive advance in a work, that demends efforts of intelligence and the successive combinations of experience based on a positive science like geometry, there is nothing but to follow step by step the approximate and more or less happy solutions of the given problem, to show each improvement, the abandonment of certain methods that cannot l lead to a definite solution. This is what we are going to attempts to do, in regard to these vaults extending around sanctuaries, passing successively through the combinations presenting themselves to the architects of the middle ages, from the starting point given to them,to the very complete solution of the problem set by themselves.

The Romans had turned cross vaults on isolated piers of square section, from the first times of the imperial period and perhaps under the republic, to cover cisterns and lower stories. These vaults had no transverse arches: they were half cylinders crossing at right angles in plan (Fig. 14).

When the Byzantines desired to vault circular galleries supported at one side on isolated columns, they turned archivolts from one column to another, and above the crowns of these archivolts they constructed an annular tunnel vault, or indeed an enclosing wall, and they erected a half tunnel vault that supported the line of crowns on the wall raised above the archivolts. Thus they avoided cross vaults, i.e., the penetrations of archivolts into annular tunnel vaults, and in that they followed the Roman tradition.

But this method of construction compelled the architects to lose a considerable height above the archivolts, and also to raise a structure, if they desired to find over these circular side aisles, either a gallery in the second story or windows. They one takes up at the end of the 11 th century in the West the method of causing the archivolts to penetrate the annular tunnel vault. Now in that case, see the difficulties that present themselves in a sanctuary supported on columns, (Fig. 15), or if the abacuses of the capitals are square as at A, the archivolts are wider at a b than at c d, or if they desire the soffits of the voussoirs of these archivolts to be parallel, the abacuses of the columns must be trapezoids in horizontal p projection as at B. In the first case, these archivolts are portions of cones; in the second they are cylindrical; but if

curve of the sanctuary is not very large, these abacuses in t trapezoidal form have an effect very disagreeable to the eye, and produce acute angles that badly resist a load. Seen diagonally, these capitals appear to project more at one side than the other, and seem to rest badly on the shafts (see D). Men t then attempted to adhere to the square abacuses; but instead of turning vaults normal to the curve of the sanctuary on a conical surface, their crowns were kept in a horizontal line, and the curve a b was an oval, while the curve c d was round; or indeed the springing of the archivolt was skew from a to c and b to d, so as to have at c d and a b a round-arched curve, and this last then gave the section of a tunnel vault that penetrated the annular tunnel vault.

Thus were constructed the vaults of the side aisle of the ch church of Notre Dame du Port at Clermont (Fig. 16). But (see plan A) if one desired the arch a b.to be round, traced along the wall of the side aisle, the diameter a b being greater than the diameter,c d and the diameter e f, the springing of the arch e f must be placed at a level much higher than that of the springing of the arch a b; so that an elevation made perpendicular to the axis X O would give the projection traced at B. -- Always assuming the crowns on a level --and that in a section made on O X one would obtain the projection traced at D, the springing of the archivolt they follows on the impost the dotted line g h. Vaults so conceived could not be rigorously drawn on the diagram; they were only obtained by experiments and by an empirical method. Yet the archivolt e f, that was only a penetration and was not detached from the vault, must support the wall of the axis, and could not be made of rubble or concrete on a mould, and it was necessary to construct it in cut stone. Hence one conceives the difficulties, that assailed the constructors. Properly speaking, there are no archivolts here, but skew tunnel vaults penetrating an annular tunnel vault. Thus one soon recognizes that there is an advantage in separating the archivolt from the vault, in making it independent. But then how to support the imposts of these archivolts on the square abacuses of the capitals? Here is drawn the abacus (see A, Fig. 17), the archivolts are projected in D D. We draw the imposts or the first voussoir od this archivolt at a a; there will remain between their extradoses on,y the bearing b, and

the space c d for the springing of the vault. But as the springings of the archivolts are higher than those of the section of the annular vault, it results from this, that if one desires the groin to spring from the abacus, these groins are separated from the verticals and form reentrant angles e c f, g d h, with a meagre and disquieting effect, indicated by the perspective sketch A'. If these are good reasons for making the archivolts independent of the vault, one must at least find them as good for turning the transverse arches springing from the isolated column to reach the engaged column of the side aisle; transverse arches that must facilitate the construction of vaults turned by dividing the annular tunnel vault into bays. But where is to be placed on the square abacus the impost, the first voussoir of this transverse arch? If (see B, Fig. 17) we claim to leave the two first voussoirs of the archivolts and the first voussoir of the transverse arch independent on the abacus of the capital, it is necessary for us, either to give a little bed to each of these voussoirs, or to increase very much the top of the abacus, and in that case there will remain two unoccupied angles of this abacus; all the loads will come to rest on V, i.e., inside the axis of the column, and will tend to make it inclined. Further (see perspective sketch B') the springings of the archivolts being at a higher level than that of the springing of the transverse arch, there will remain above the springing of that arch a vertical triangle T, and the groin of the vault can commence only at i, the point where the curve of the penetration touches the extrados of the transverse arch. There is no need of insisting on the bad effect of this combination. If (see C, Fig. 17) from these three arch members we form an impost composed by the intersection of the beds of the arches, they will become independent only when the curvature of their extrados is detached from the vertical; but since the springings of the arches are not on the same level (see perspective sketch C'), we shall again have at t a vertical triangle, that will carry the springing of the groin to s. For artists that seek forms most appropriate to the purpose, those transferred groins, not springing from the bottom of the reentrant angle, having the appearance of resting on the spandrel of the transverse arch, cannot be a satisfactory solution. These archivolts and transverse arches resting like a "bec de flute" (flute mou-

mouthpiece) on the abacuses do not present a construction conformed to the principle of the vault borne on projecting arches; principles that require each of these arches to retain its form and dimensions in its entire extent. The masters they attempted other combinations. At first they thought that the transverse arch, that bears no load, could be reduced in width, that apparently left more bed to the first voussoirs of the archivolts and allowed the vault to spring from a lower point. For some time they adhered to this last system while cheating as much as possible, either by giving more depth than width to the abacus, or by corbelling the first voussoir out a little on the abacus, so as to detach it. Still the construction of the vaults themselves had followed this progresss At first made of rubble laid on a form, their springing was soon made of cut stone, and then one attempted to construct them entirely of dressed and jointed rubble. For stonecutters not familiar with the art of drawing, AA we are speaking of the first years of the 12 th century, -- it was not easy to trace the jointing of the circular cross vaults; thus those first jointed vaults present the most eccentric joints, and the most naive expedients. Without experience, those artists had tenacity and saw a definite purpose, and they give us no small instruction, when we are willing to follow step by step the stages, that they made in the art of construction, without abandoning for a single day the path traced by their first attempts. Their deductions are connected by a rigor of logic, whose equivalent can be found at no other epoch; and especially in Ile-de-France one verifies the persistence of constructors in following the consequences of an adopted principle.

The side aisles of the collegiate church of Poissy were built frog 1125 to 1130. Being supported at the side next the sanctuary on single columns, the vaults of these side aisles already possess separate transverse arches and archivolts with springings at the same level; it results from this that the cross v vaults spring in the reentrant angle formed by the extrados of these arches, which are nearly independent. We say nearly, because the architect has cheated in separating as much as he could, the springings of these arches without loading the columns too unequally. For that he has given a little more projection externally to the abacuses of the capitals, and these not being

square but with their sides normal to the curve of the chevet. (See A, Fig. 18). This constructor has further doubled the archivolts of the side of the aisle so as to raise the vaults, and to cause the extrador of this second arch to have a greater radius. From a to b exists a thick side arch -- considering the distance between the engaged piers P P -- as much greater then are the radii of the archivolts of the transverse arch. Thus the architect has placed the springing of this side arch lower than those of the other arches, as indicated by the section C made on the axis O A. In spite of the lowering of this springing, the crown of the side arch rises above that of the doubled archivolt, and the vault presents a rampant section, that is further favorable to the introduction of light. It is necessary to turn vaults that also do not have diagonal arches. These vaults being constructed of roughed rubble, the constructor proceeded as indicated by the perspective (Fig. 19). He has connected the voussoirs at the intersection of the tunnel vaults forming groins by means of skew cuts made on the job. One conceives that this structure cannot be very solid, and that these groins only support themselves because the angles that t they form are very obtuse. Their appearance not being satisfactory, men did not delay to guard against these inconveniences. But it is necessary for us to glance at what was done at about the same epoch in other provinces, where the Romanesque school had shown great splendor.

In Auvergne from the end of the 11 th century, as we have seen, the school of constructors had brought into the construction of curved vaults notable improvements, yet without seeking with as much tenacity the solutions of the set problems, as did the school of the North.

We find a curious example of this fact in the church S. Julian of Brioude, whose choir was entirely rebuilt in 1140. Before passing over and following the rapid advayce of the constructors in the North of France, it is necessary to stop an instant before the vaults of the apsidal side aisle of this monument. While at S. Denis in France, Suger caused the reconstruction of the church of his abbey according to an entirely new system of construction, there was erected the apse of the church of Brioude. There the annular system without transverse arches is s still accepted; the archivolts alone open into the sanctuary

penetrated by tunnel vaults normal to the curve of the sanctuary, and consequently forming cross vaults. At the windows lighting the side aisle between the chapels, tunnel vaults of diameters smaller that the bays penetrate the annular tunnel vault. But what must be the object of a careful examination of a these vaults, is that they are entirely cut and are no longer constructed of concrete, rubble plastered, or even of rupple cut and fitted togethe as in the side aisle of the church of S. Louis of Poissy.

On their part the people of Auvergne also sought progress, but only in the mode of execution, without changing enything in the Romanesque system. Here (Fig. 20) is the jointing of o one of those curved cross vaults. At A is the archivolt opening into the sanctuary.

One sees that the architects of Auvergne at the middle of the 12 th century had not yet adopted the separate transverse arches, and that the stone vault rests directly on the abacus of the capital. However irregular as it is, the jointing of t the groins is conformed to the theory, and is composed of stones of quite large volume cut wit care. Between the apsidal chapels, here (Fig. 21) is how are arranged the penetrations of t the openings that light the side aisle. The engaged columns support the vault itself and not the arches, which in the provinces of the North at tha epoch, are already loaded to support it. Yet in the first bay of the side aisle of the choir of Notre Dame du Port at Clermont, whose construction is more than 50 years earlier than that of church S. Julien of Brioude, one notes a separate transverse arch, projecting very little it is true, and consequently in part imbedded in the vault itself, but which finally already indicates the tendency to divide annular vaults into bays. This example was not followed in the circular side aisle of Brioude, whose vaults are still frankly Romanesque in combination, but constructed with more knowledge and c care. Having shown the tendency of that central province to not abandon its Romanesque traditions, even for the construction of annular vaults placed on isolated piers, and that require entirely novel combinations, we shall follow the advance of the rapid improvements introduced into the structure of the vaults belonging to the edifices of the North.

By referring to Figs. 1, 2, 5 and 8 of this Article, one will

observe that the Romanesque vaults, which present a perfectly homogeneous structure if only considered superficially, in fact consist of ribs and of neutral parts, or if one prefers that definition, of a framework and of fillings made as light and as inert as possible. We have given the two principal reasons causing the adoption of this system; it first is the economy of carpentry centerings; the second is the advantage of turning vaults according to a rapid method that ensures their homogeneous structure, uniform drying of the mortar, at the same time as a perfect solidity of the greatest lightness possible. We have seen that in the construction of cross vaults, the Romans imbedded brick groins in the thickness of the vault itself, just as they imbedded transverse arches in the thickness of t tunnel vaults and ribs in he thickness of domes. This method was judicious, not to be attacked from the point of view of s solidity; was it so from the point of view of art? If architecture has as its object to conceal none of the procedures in construction that it employs, but on the contrary to emphasize t them by giving them proper forms, it is evident that the Romans frequently mistook that principle; for when the vaults were p plastered and covered internally by stuccos and paintings, in combinations independent of the skeleton, it was impossible to know whether those vaults had or had not transverse arches and ribs in their structure. That resistant skeleton, judged necessaryfor their stability, was always visible; if it is partly accented in the dome of the Pantheon, it is no so in the vaults of the Baths of Antonine Caracalla, those of the basilica of Constantine, and in the great hall of the Baths of Diocletian. Thus the question is reduced to its narrowest limits. Should not all construction be for the architect the motive of an arrangement intelligible to the eye? The Greeks, justly so extolled as artistsand so little understood, in applying t their principles, have they done anything in their architecture but to regard the construction as the reason determining every form! Where have they concealed the least members? And those little edifices of central Syria mentioned above, are they not the most vivid expression of that feeling of the Greek, that led him in matters of architecture to regard all construction as the element constituting the visible form, even after he suffered Roman influences, so contrary to the taste of the Greek?

But the Greeks of the late time in central Syria did not build cross vaults of great dimensions. They accepted from the Roman inheritance only the arch, tunnel vault and dome. Yet t they appropriated these forms while adding to them their rational arrangements, and these tendencies are very marked, for the western men could follow that course, when they saw those monuments at the end of the 11 th century, but going much farther than had been done by the inhabitants op those little cities scattered over th route from Persia to Byzantium.

Now one can ask from all men of good faith; to admit the principle of construction of Roman vaults, to become inspired by the analytic mind of the Greek, by his taste for truth, his innate feeling for form, for to constitute a complete system from those elements, is not that an advance? And is it right to reject as superannuated this system, if otherwise one only knows how to reproduce the apparent form of Roman construction, without taking from it what forms its principal merit, economy of means and simplicity of execution?We pelieve it sufficient to propose these questions, that everyoni may decide where progress stopped and where decadence commenced.

To adopt the Roman vault, but to reason like those western a artists of the 12 th century is in our eyes one of the most complete revolutions and best justified, that have ever occurred in the domain of architecture. What said those artists themselves! "In constructing their vaults, the Romans considered two objects, a skeleton and a neutral filling; but from these two distinct objects they derived only a visible form, a concretion, thus confusing the part that supports, the essential thing, and the part supported or inert. If the intention is excellent, if the material result is satisfactory, the result is vicious as art; for in the art of architecture, which is a sort of creation, the real function of each member must be emphasized by a form in accordance with that function. If a vault can support itself only by a framework of ribs, this framework is not intended by art to be concealed, it must be visible, the more apparent as it is more useful. The Greeks accepted this law without allowing any exceptions. That the western architects reasoned thus in the midst of the 12 th century,we do not affirm; but t their monuments do this for them, and that suffices us.

Romanesque architects had first adopted the tunnel vault as

being the simplest and most easily constructed. Already about the end of the 11 th century, they had ribbed those tunnel vaults, not by arches and more resistant materials imbedded in t the thickness of the vault itself, but by projecting [1] transverse arches giving greater strength to these tunnel vaults at the poin s of support. The continuous thrust of this kind of vaults soon caused them to be abandoned. Then remained for vaulting the great spaces of halls and naves the cross vault and t the dome on pendentives, then perfectly known in the West, since for more than a century domes on pendentives had been built in the West and the Centre of France. [1] The Roman cross vault formed by th intersection of two half cylinders gives as the curve of junction a plane curve, that justly worried constructors no longer possessing the excellent mortars of the empire. [2] The dome on pendentives required much height and needed a complicated and expensive centering of carpentry. As we have already stated, those masters of the 12 th century then sought a mean between those two structures; they raised the crown of the cross vault just as the Byzantines had done. (Fig. 10). But, and here appears the real innovation in the art of construction, -- they caused to project from the Roman or Byzantine cross vault the rib imbedded within it, built it of dressed and resistant materials, and se on the centering of carpentry; then instead of constructing the vault around the rib, they built it above this, then regarding that arch left to project below the work as a permanent centre. In the porch of the abbey church of Vezelay are already seen two vaults so constructed (about 1130); but in the abbey church of S. Denis (1140) the new system is completely developed. The vaults there are rather domes than cross vaults, but without exception they are all ribbed parallel and diagonally by projecting stone arches, and these arches are all third point, i.e., formed of circular arcs intersecting at the crown. The logical deductions from this system were not delayed. In the Roman vault composed of cells, as we have seen in Fig. 1 etc., the fillings of these cells is supported but is inert and has no curvature that could transfer the weight to the walls of the cells. Since the constructors of the 12 th century detached the ribs from the vault, making permanent centres, it was natural to vault the fillings on these ribs, i.e., to give them a curvature in all directions, that should actually transfer

their weight to those arches. Thus the vault was composed of several vaults, as many compartments as void spaces left between the arches. From the solid Roman system -- in spite of the different members composing the Roman vault, -- the masters of the 12 th century by separating those members and giving to ea each its real function, attained to the elastic system. Much more, they inaugurated a method of construction by which were avoided all the difficulties, some of which we have indicated above, and this gave them the liberty of vaulting without trouble and without extraordinary expense, all those spaces, however irregular, taking the heights that suited them, both for the springings of the arches and for the level of the crowns.

Note 1.p.500. Art. Construction, Fig. 3.

Note 1.p.501. Art Coupole.

Note 2.p.501. Art., Construction, Fig. 4.

The vaults of the porch of Vezelay (1130), some of which are already turned on diagonal arches, are built of irregular rubble bedded in mortar, but this masonry does not transfer accurately to those groins the weight of the masonry triangles; if these were removed, the vault would still stand, as there still remain vaults in the same edifice from which the diagonal arches have been removed. Here the diagonal arch is rather the means of giving strength to a weak point, of emphasizing what a structure required by necessity. This is an expedient and not a p principle. It would not be accurate to regard the projecting ribs, the diagonal arches (to give them their true name) of t the vaults of the porch of Vezelay as the first attempt of a new principle; it is an advance toward a new principle not yet seen. In fact in the art of architecture, and particularly in the practice of that art, principles do not grow ready formed in the brains of constructors, there is always a sort of intuition of the principles before their statement. To replace temporary wooden centerings by permanent centres of stone was an ingenious idea, derived from the Roman theory of the stability of vaults; it was not a novel principle; it is not a new principle to cause to project under the vault the rib imbedded in the vault; this is a simple logical deduction. But to regard these ribs outside the vault as an independent framework, and to combine on that skeleton a series of vaults, that can only support themselves because they rest on that framework, that

is then a new principle established, which has no connection with the principle of Roman construction; is is a discovery, and one so important in the art of construction, that we do n not know with what it can be compared. Constructors thus freed themselves from all the difficulties, that present d themselves at the establishment of vaults on irregular plans, and notably on curved plans. One must place himself at this point of view, if he desires to render an account of the value of this innovation; not to consider alone the appearance of the vaults, but their mode of construction. Now there exist many ribbed vaults, that are not cross vaults, i.e., which are not constructed according to this principle before unknown, consisting in a series of vaults supported on arches turned in all directions, whatever the shape of the plan to be covered. We have attempted in Art. Construction to emphasize the difference between the principle of the ribbed dome, and the principle of the cross vault, although these two vaults may have the same appearance or nearly so; [1] it would seem that our treatment of that subject was no sufficiently extended, since learned critics have not been able to appreciate all the importance of that difference. Yet it is such, that the system of the ribbed dome, successively improved and amplified, leads to a structure limited in means and that cannot lead to extended results, while the system of the cross vault lends itself to all possibl combinations, without ever resulting for the construction difficulties in the execution, either in drawing, mode of centering, or in jointing the masonry. First in the church of the abbey of S. Denis built by Suger, frankly appears the application of the last system. In Articles due to our learned friend M. de Verneilh, too soon removed from archaeological studies, [1] it is stated that the vaults of the choir of the abbey church of S. Denis are a derivation, a result of those that surround the choir of the collegiate church of Poissy, whose construction we have shown, ((Figs. 18, 19). We cannot adopt that opinion; the vaults of t the circular side aisle of Poissy do not mark the origin of the principle accepted in the church of S. Denis. Those vaults of Poissy are Romanesque vaults that attempt to free themselves from the difficulties pertaining to the Romanesque mode of construction, but which in nothing allow a suspicion of the new system inaugurated at S. Denis. Then we persist in stating that

the embryos of this system are lacking to us, that they no longer exist, or that the church of S. Denis suddenly presents in 1140 a first complete example of this mode of construction of vaults. We shall proceed to judge.

Note 1.p.502. Art. Construction, Figs. 62 to 72 bis.

Note 1.p.503. Annales Archoeol. Vol. XXIII, p. 1 to 18, 115 to 132.

Fig. 22 presents at A the plan of a half chapel around the side aisle of the abbey church of S. Denis, with the double circular side aisle. This plan being given, if one proposes the problem of vaulting it by the aid of the Roman or Romanesque systems, the solution would be impossible.

By what artifices of penetrations could one vault the chapels? By domes? Perhaps; but then it would be necessary for those domes to rest on arches, to establish pendentives, and then to occupy a considerable height. Besides these skew pendentives are irregular and produce a very bad effect. In establishing h his plan, the architect of the apse of S. Denis knew how he was going to vault it; or to speak more truly, it was the system of vaults to be employed that gave him the arrangement of his plan. First the external circle, that served him for tracing the perimeter of the chapel strikes at a the abacus of the single column b, so that the branches of the diagonal arches a c, d e, e c, are equal to each other. Having drawn the transverse arch f of the archivolt g, he takes the middle of the axis g f, and traces the two branches b i, h i, of the diagonal arches, and then traces the transverse arches h b, b l. It is clear that all these arches are independent; the architect is the master in placing their springings where he thinks proper. But (and here appears the necessary results of the system adopted), if he had traced these arches as round, either it would have been necessary for the springings of these arches to be at very different levels, if it were desired to have their crowns raised to the same level, since those arches are of very different diameters, and thus arise difficulties that we have previously mentioned for closing the triangular vaulted compartments; or if the springings of those arches had been placed at the same level, their crowns would have reached very different levels. Then the architect employs the third point or pointed arch, that ensures to him all liberty to give to the crowns the

the proper heights. Thus the revolved portion B indicates at l'b' the transverse arch l b, at b"h' the transverse arch b h, at c"e' one of the branches of the diagonal arches of the chapell, at o b' the transverse arch b f, at b"i' the branch b i of the diagonal arch b i, at b"'p that of h i. It results from this drawing that the crowns o, f, i, are on the same level, and that the crowns of the two transverse arches h b, b l, are also on a single level line, lower than tha of the three crowns o, f, i. It remains to turn the vaulted triangles on this skeleton, which rest on these pointed arches. The lines of the crowns of these fillings necessarily abut at the highest point of these arches and give the dotted projections i g, c r, and pass in t the axial line c g. A small difficulty presents itself in the main part of the chapel.

The architect must have pierced the windows D, not in the middle of the curve k e, but nearer the central pier e, so as to avoid the buttress C. Now the archivolt of that window taking the place of a side arch, its crown is found at t; the line c t of the crowns ... then divided very irregularly the triangle k e c; and there remained from k at s a space between the extrados of this archivolt and that of the branch of the arch k c, which could embarras the mason charged with turning the vault on the triangle k e c. The perspective view E shows at F how that little difficiilty was solved. The vaulted filling begins ar commnced a dome on a circular part; then the curved surface became skew as it ascended, and sought the extrados of the archivolt and that of the branch of the diagonal arch. At G a horizontal projection indicates the arrangement of the rows of dressed rubble at the springing of the curved surface between the arches. On the perspective sketch E, one sees that the archivolts of the windows acting as side arches penetrate the branch of t the diagonal arch on the axis at its springing. One will also note that the springings of the diagonal arches of the chapel are at a level lower than those of the other arches, and that consequently the abacuses of the capitals drop one course. (See at Y).: Excepting some experiments, some parts not clearly studied, the system is complete and frank; the freedom of the architect is acquired, and from this first trial it is easy to attain the most extended results. The perspective sketch E shows well, that the triangular fillings in cut rubble transfer

their weight to the ribs, are turned on their extradoses, and that those already at S. Denis exactly fulfil the function of permanent centres supporting the vault or rather a combination of vaults. By a remnant of respect for tradition, perhaps also by a lack of absolute confidence in the goodness of the new system, the crowns of the side arches and lateral transverse arches are kept lower than those of the diagonal arches, so as to leave to the combination of triangular vaults a general domical form. This system persisted until the first years of the 13 th century.

What proves how radical and novel is the system of vaults adopted in the reconstruction of the abbey church of S. Denis, are the contemporary or slightly later monuments, in which one again perceives hesitations and remains of Romanesque traditions, from which the architects have not dared or could not free themselves. From this point of view, the vaults of the cathedral of Sens merit a thorough examination. M. Challe at the scientific congress at Auxerre in 1859 perfectly established, that the cathedral of Sens could not have been rebuilt after the fire of 1184; but one cannot admit that it was commenced by archbishop Henry of France after his enthronement, i.e., 1122, ten years before the narthex of the abbey church of Vezelay. The character of the architecture, the mouldings and the sculptures, cannot make it supposed that the cathedral of Sens was commenced before 1140, little before the death of archbishop Henry. Indeed the texts state that he began that edifice, but not at what time of his episcopate that foundation occurred. Now in 1137 abbot Suger commenced the reconstruction of his church, in three years and three months he had completed the choir. Admitting that the cathedral of Sens may be contemporaneous with the church of S. Denis, they were still working on it in 1177, and its erection was continued slowly.

The cathedral of Sens then cannot pass as having served as a starting point for the works of S. Denis, and the vaults of S. Etienne of Sens show an indecision (especially the lower vaults) and experiments, that no longer appear at S. Denis.

Let us examine (Fig. 23) a half bay of the nave of the cathedral of Sens. The vaults of the side aisle A have transverse arches C, that are round (see the revolution at C'). But the bays of the nave being double (hexapartite), i.e., alternately

composed of great pieces P to support the transverse and diagonal arches of the high vaults, and of intermediate piers S composed of coupled columns intended to bear only the arches intersecting the high vaults, the diagonal arches of the low vaults resting quite awkwardly on these piers. The diagonal arches revolved at D have their branches unequal, a b being shorter than b c. At c the constructor, not having reserved a little column to receive this branch b c, must place a corbel at the height of the impost of the transverse arch and of the side arch (see the perspective sketch G); thus he has been able to diminish a part of the difference in length of the diagonal arches. These branches of the diagonal arches rest elsewhere on the projection of the abacuses of the capitals of the coupled columns S a and on the little engaged columns of the great piers. Although the transverse arches C are round, the archivolts E of the nave are pointed (see their revolution at E'). Besides the crowns of the diagonal arches attain the level d above the level of the crowns of the transverse arches and the archivolts; so that these vaults are strongly swelled, and are constructed of cu rubble, as stated above. This mixture of the round arch and of the pointed transverse arches and archivolts is nowhere found in the construction of Suger a S. Denis. The branches of the arches are more skilfully placed at S. Denis. One does not see there those corbels, that appear to have been an expedient at Sens, and which we also find in the low vaults of another monument in Champagne, at Notre Dame of Chalons-sur-Marne. Now if we pass to the high vaults built some years later (especially that as we have stated that the works at Sens were slowly conducted), we find a system of vaults quite interesting to study, because it illustrates several questions concerning the construction of these important parts of our edifices of the end of the 12 th century. These high vaults are on a square plan with an intermediate transverse arch; a method adopted with rare exceptions for the naves of the second half of the 12 th and beginning of the 13 th centuries. [1] At Sens this arrangement of the high vaults is perfectly indicated by the forms and dimensions of the piers. The diagonal arches P V are round; [2] their revolution is at p m. The intermediate transverse arch S M is revolved at s m. The transverse arches P O are revolved at r o. As for the (old) side arches, they were round and are revolved

at n t. One will note that the curve of the extrados of the diagonal arch (revolved) intersects at v the side arch at the level of the extrados and its crown (in vertical projection), so that the line of the crowns of the triangular fillings M g (in horizontal projection) is given by the curve v m of the extrados. The half triangle M g h is then a section of a dome, and can be constructed according to the mode suitable for that kind of vault, i.e., by a series of courses of concentric rubble stones. There is a point that should not be lost from sight, for it clearly indicates, as we claim to have established in Art. Ogive, that the form of the dome still preoccupied the architects of the first so-called Gothic period. Yet the rows of rubble of these fillings are set parallel to the line M g of the crowns, so as to transfer the weight of these fillings entirely to the transverse and diagonal arches. But one might object that the round side arches exist no longer and were replaced at the end of the 13 th century by others, pointed and much higher, a and that we establish our drawing only on a hypothesis. Here then (Fig. 24) is the proof of the preceding drawing. At A is the horizontal plan of the springings of these great vaults of the cathedral of Sens. B is the transverse arch; C the diagonal arch; D the intermediate transverse arch. At E is drawn the section on the great axis, and that part of the vault. The little columns c still exist in place with their capitals, and in the bays of the choir the branches b c of the side arches have been left below the side arches raised at the end of the 13 th century. These elements suffice to indicate the height and precise form of the old side arches of the 12 th century. But let us see what also supports our restoration. For the length of the nave the cornice F is preserved; below is an ornamentation by little round arches, that rest on an arch that formerly necessarily opened above the vaults as indicated by the section G. The cornice F was raised to allow the ties of the carpentry to pass above the extrados of the vaults; and this arch G gives light and air under the roof. In the choir of the abbey church of Vezelay, which dates from 1180 to 1190, the side arches are likewise round, and are thus arranged below the crowns of the vault. The high vaults of the church Notre Dame of Chalons-sur-Marne possess in the choir stilted round side arches. Thus there is nothing in this arrangement not conformed to the construction

of the vaults of edifices near Sens, or belonging to the same province. The dottel line g h indicates the plane of the side arches rebuilt at the end of the 13 th century, side arches that surround the great tracery windows, whose archivolts now intersect the remains of the arcade formerly opened above the vaults. Fig. 25 gives this arcade on the exterior, the traces still in place and numerous fragments permit its restoration without difficulties. [1] In piercing new windows, the architects of the 13 th century were contented to close the openings formerly looking under the roof, and to cut into the jambs and round archivolts according to the curve of the archivolt of t those new openings. One still sees in place at several points the capitals C, portions of archivolts, and the entire upper part B. At A are the heads of the flying buttresses dating from the primitive construction. This upper arcade opening above the vaults is again found in many Romanesque churches of the Rhenish provinces, and had penetrated as far as the eastern p parts of Champagne. Its presence at Sens is no less a very remarkable fact.

Note 1.p.508. Arts. Construction, Ogive, Trovee.

Note 2.p.508. Today the centre of these arches is at I; but after removing the centering occurred a slight lowering of the crown, and later a small separation of the walls, that must slightly deform these arches, whose centres must be placed on the upper line of the abacuses.

Note 1.p.510. It is due to the courtesy of M. Lance, diocesan architect of Sens, and the intelligent borings made by his inspector, M. Lefort, that we have been able to recover accurately this arch, that presents so curious an arrangement. In our restorations the form of the windows is all that is doubtful, although the jambs of those windows are still masked on the exterior, and coincide with the jambs of the arcade of the triforium. (Art. Triforium).

It results from this study that the high vaults of S. Etienne of Sens were very swelled, presenting concave triangles strongly inclined to the exterior; that the constructors dared not free themselves from the generating form given by the dome for the drawing, although they had already adopted the method of construction of triangular vaults for the fillings, transferring the loads to the transverse and side arches; at least that

appears probably, since this method is adopted for the vaults of the side aisles, that are older, and for the high vaults of the choirs of Vezelay and of Notre Dame of Chalons-sur-Marne, that are of the same time or nearly so, as these high vaults of the cathedral of Sens. The triangles taking the side arches as bases, having been rebuilt at Sens at the end of the 13 th century, -- although the diagonal and transverse arches were not changed, -- however we cannot positively affirm that the courses of rubble of these triangles were set parallel to the line of the crowns (Fig. 24). It would be possible for the courses of rubble of the half triangle s i l m to have been set parallel to the live l m of the crowns, and that the rubble of the half triangle n l m was set in horizontal courses, since the line l m was only a segment of the diagonal arch (extrados), and that consequently this half triangle n l m was a portion of a sphere penetrated by the side arch. This construction would have been very singular and exceptional if not adopted. Yet then was such freedom there in the manner of setting the fillings of cross vaults, that no conjecture should be absolutely rejected. Due to this liberty, the architects of the second half of the 12 th century were able to vault without difficulty irregular areas, and notably triangular spaces between piers, as may be seen around the choir of the cathedral of Paris. The sanctuary of Notre Dame of Paris is surrounded by double side aisles (Art. Construction, Fig. 44); the second row of piers naturally being farther apart than the first, and the third than the second; the architect has multiplied the points of support so as to present always openings of nearly equal spans. Fig. 26 gives a bay A of the sanctuary of Notre Dame of Paris, the first side aisle B and the second row C of the cylindrical columns. D are archivolts; F are concentric transverse arches; F are radiating transveese arches, and G are diagonal transverse arches. All these arches are pointed, so that tn their intersection and highest point is at d for the first, e for the second, f for the third and g for the fourth. To vault those triangular areas, the constructor has connected the highest points of the extradoses of the arches F and G by curves or swelled crown lines f g, g g, g f. He has vaulted by curved surfaces, by courses parallel to these crown lines, the triangles g g O, g f I, by setting in the ordinary manner each of these

courses of roughed rubble on the extradoses of the branches O g, I g, I f, of the arches. The highest point of the crown lines f g and g g is at h, and this point is at a level sensibly above the highest points d and e of the archivolts D and the transverse arches E, since the radiating transverse and diagonal arches F and G are drawn on a greater diameter, and their crowns are thus already higher than those at d and e. Those crowns at the highest points d h, e h, have then been connected by a curve; then imaginary lines have been drawn from l to h, from k to h, and i to h; these lines are curves by which must pass the courses of rubble. The extrados es l and e of the transverse arches have been divided into a number of equal divisions according to the thickness of the courses of rubble; the same number of equal divisions was made on the curve l h, for example; then the lines joining these points gave the joints of the courses of rubble, which presents the structure sketched at H and P. Thus these concave triangles rest their weight on the stone arches connecting the piers. It is clear than any o other system of vaults could not solve in such a simple manner t the problem of construction proposed in this case, and we shall even add, that the systeo of the Gothic vault alone leads itself to close those triangles left between pointed arches. Thus see where the architects had already arrived in Ile-de-France about 1165. Still many improvements yet remained to be introduced into the method of constructing these vaults, particularly in t the mode of placing the arches on the piers.

To add groins either to the cross or the cloister vault, or to the spherical or polygonal dome, or rather to place under those vaults permanent centres of stone instead of temporary centres of carpentry, was a novel idea; as we explained at the beginning of this Article, it was to cause the skeleton imbedded in the thickness of the Roman vault to appear beneath that vault; it was to utilize it no longer as a reinforcement, but as a support and soon the only support; finally it was to render the skeleton independent of the vault itself and to allow the use of all possible systems of vaulting. Still the deductions based on this system only presented themselves successively. Thus the swelled Byzantine cross vault being given, to reinforce the lines of intersection of curved surfaces by means of st stone groins within; to take from the swelled vault the arches

imbedded within the depth of the lines of intersections, to pl place them beneath those lines, so as to rest the triangles of the vault on the arches, was evidently the firs idea that presented itself to the minds of the constructors in the 12 th century; but this removal of a member of the Byzantine vault, imbedded within its thickness to place it beneath the vault did not modify the vault; that remained, its framework is visible outside, and tha is all. Now it is necessary tc find the proper place to receive that skeleton. the novel presence of this framework requires additional bearing. That is indeed what occurred. Let (Fig. 27) be an impost A of a swelled Byzantine cross vault supported by isolated piers. The constructor has t the idea of allowing these brick groins imbedded in the thickness of the vault to project, so as to build the vault no longer around these ribs, but above them. The operation that first presents itself is this; he chamfers the corners of the impost, and sets, not in brick but in cu stone the voussoirs b outside the angles. He will project the faces c of the transverse arches d. The entire impost thus modified will then occupy a s surface f g h i, larger than that occupied by the impost of the primitive vault. It will further be necessary either that the capital be expanded considerably, or that the pier be larger. But still the architects in the 12 th century already felt it necessary to reduce as much as possible the poin s of support in the in eriors of edifices. The new system adopted then seemed in contradiction to that accepted requirement. The capitals were enlarged; but not daring to load the entire projections of these curves corbelled from the face of the piers, then added to them, not a uniform increase of area, but supporting members, as we have shown in Fig. 9, that also permitted the reduction of the principal mass of the pier.

Thus originated those clusters of engaged columns, that are a first logical deduction from the new method of vaulting. Since the transverse and diagonal arches were removed from the Byzantine vault to appear beneath its internal surface, it was natural to take from the mass of the pier members to support these a ches. The idea of absolute reduction of the entirety only came successively. One even sees in the oldest monuments vaulted according to the Gothic method, that because of the operation ju jus indicated, the piers occupy an area relatively greater th-

than that occupied by the piers of the last monuments of the R Romanesque period. Men believed it necessary to find additional surfaces suited to receive the newly adopted arches. This arrangement is especially apparent in the provinces in which the work of of transition from the Romanesque to the Gothic vault proceeds slowly and timidly. Thus the piers of the nave (without side aisles) of the church of the Trinity a Laval, which dates from the middle of the 12 th century, bear a complete system of transversi and diagonal arches (Fig. 28). Here the architect believed it necessary to find on the abacuses of the capitals a clear place, or nearly so, for each of these arches, which are each independent above the imposts.

Yet in Ile-de-France from 1140 the arches intersect at their springing, as one sees around the choir of the abbey church of S. Denis. One notes indeed still many experiments and embarrassments, but the principle of penetration of the arches at the impost is already adopted.

At the cathedral of Senlis, whose construction is little later than that of the church of S. Denis (part of the apse), one sees that the architect has sought to cause the diagonal arch of the chapels to penetrate into the transverse arch of the w width. Fig. 29 gives at A the angle pier of these chapels ((small depth like those of the church S. Denis). The transverse arch of the entrance is at a and the diagonal arch at b. This diagonal arch starts on the column intended for the transverse arch. The perspective sketch B shows at a these penetrationg transverse arches, and at b the diaconal arch. It is well understood that the imposts of these two arches are no longer i independent, but are cut in the same courses up to the level y. Soon these arches are grouped more and more at the impost and penetrate each other, which allows the reduction of the section of the pier supporting them. The arches contracting into a cluster are in fact no longer a reinforcement or skeleton to support the vault, but become the vault, and the fillings closing the intervals between these arches are reduced more and m more to the function of li tle vaults. The proof is that from the 13 th centurw between the transverse and diagonal arches are added new and supplementary ribs. Thus is developed the principle adopted in the 12 th century beyond the knowledge, so to speak, of those who first recognized it, by a series of

results linked rigorously. Such is in fact a property of the p principles accepted in everything, that they became fertile, n necessary and a fated source of deductions. That is why we repeat constantly; take little account of forms, if you do not find them to your taste, but adopt a principle and follow it; it will give you the forms necessary and suited to the object, the time and the needs. And that is also why those that dislike to subject themselves to a principle, because it compels the mind to reason, hope to deceive the public by claiming, that t the studies of our French architecture of the Middle ages result in causing the adoption of superannuated forms. Forms are not necessary in all that; a method is required; it is true th that this is never admitted by the architects, by whom every method is regarded as a restraint in the development of the imagination, or to speak more correctly, in the satisfaction of their expensive caprices.

In the great edifices, vaults established as are the high vaults of the cathedral of Sens present in general the appearance of polygonal domes. The constructors dared not yet keep the crowns o those great vaults -- crowns of diagonal, transverse and side arches, -- all on the same level. Yet at the cathedral of Paris, the high vaults of the choir were completed before 1190, and are much less swelled than those of S. Etienne of Sens. It is clear that the more the vaults are swelled, the more necessary is it to raise lateral walls above the side arches to support the tiebeams of the carpentry, which must pass freely above the extrados of these vaults. There results from that arrangement a useless waste of materials, a heavy arrangement that must be occupied by an opening, if one pretends to make it lighter; but then is also a considerable expense for t the secondary object. By raising the crowns of all arches to t the same level, there is to be placed over the side arches only the cornice and a low wall suited to receive the carpentry of the roof. Then toward that result tend all the efforts of constructors from the beginning of the 13 th century. The new system further lends itself perfectly to the leveling of the crowns, since the small filling vaults transfer all loads to the diagonal and transverse arches, never to the side arches, which rigorously could be omitted. [1] Already in the nave of the cathedral of Amiens, the crowns of the side, transverse and d

diagonal arches are nearly on the same level. It is the same at the S. Chapelle of the palace at Paris, and in many other edifices built from 1230 to 1240. The filling vaults retain a curvature in all directions, and they are concave, so that their crowning courses are curved.

Note 1.p.517. In fact there exists a very great number of vaults of the 13 th and 14 th centuries without side arches. The vaults of the cathedral of Clermont, for example, are without them.

In Art. Construction, this mode of construction is sufficiently detailed, that we do not have to enlarge here on that subject. But we shall state, that in spite of the curvature given to the triangular surfaces of the filling vaults, if they were of very large dimensions, as the crowns of those arches were brought to a level, one fears the loosening of those wide curved surfaces, and he seeks to reinforce them between the transverse and diagonal arches by ribs, to which was given the name of ribs in the 16 th century. These supplementary arches abut against the rib extending from the crown of the transverse arch to the crown of the diagonal arch. Perhaps to the central vault of the transverse aisle of the cathedral of Amiens, this system was applied for the first time. [1] This square vault that spans an average of 47.3 ft. between axes of piers, probably appeared too wide to the constructors of that edifice to be built according to the method accepted until then. We present (Fig. 30) the plan of a quarter of this vault. At the centre C is a crown opening for the passage of the balls of the spire. The ridges are projected at a b and the ribs at e f. These ribs join the middle of the ridges. At A B we have drawn the revolution of the transverse arches; at G E that of the diagonal arches; at G F that of the ridges, and at H E the vertical projection of the ribs. It is evident that the crowns of the arches attain very nearly the same level. The ridges are curved and are turned to be able to support themselves, and receive at F′ the ends of the ribs. The courses of rubble of the filling vaults are no less set parallel to the lines of the crowns, i.e., to the ridges, and the ribs are only there to reinforce those courses of rubble at about the middle of their curvature, whose rise is given by the ridge a b.

Note 1.518. The construction of this vault seems to date from

the end of the 13 th century, perhaps from 1270. It was partly repaired later, quite unskilfully, after the burning of the s first spire; but it is certain that the ribs and ridges existed before that epoch, for the starting points are old.

The adoption of this system in England was combined with an arrangement peculiar to that country, of courses of rubble in the fillings (Art. Construction, Figs. 62 to 72); which produces combinations of vaults entirely different from those adopted by the French school.

About the end of the 13 th century in Normandy are already seen vaults, whose transverse and diagonal arches have their crowns at the same level, and that are connected by horizontal ridges, not curved. This is a sort of mixed system, between t the English system, to which we shall soon return, and the French system. The central vault of the transverse aisle of the cathedral of Bayeux, which dates from that epoch, gives as a remarkable example of this sort of structure (Fig. 31). At A is projected the quarter plan of that vault, pierced by an eye for the passage of the bells. From a to b are horizontal ridges without extra ribs. The transverse arches are revolved in B C, the diagonal arches in D E, and the ridges are projected at G E. These horizontal ridges are not jointed as platbands, for their great length and weak section would not have permitted it; they pass through the rubble filling, which thus supports them like a line of keystones. The section H illustrates this jointing. In their greatest curvature, i.e., near the transverse arch, t the courses of rubble are inclined according to the lines g h, and in approaching the eye these curves naturally take a much flatter curvature i h. The ridge is then held by the abutment of these courses of rubble, it loads and strengthens their point of junction. In such a case the triangular fillings are rather parts of cylinders than concaves as in the preceding example. The sketch M gives the projection of the eye with the beginning of one of the diagonal arches O and of a ridge L. These connections are reinforced by cusps as gussets, that give strength to the points of junction. See (Fig. 32) how are jointed these connections of the arches with the eye. The eye is composed of eight pieces. The four corresponding to the diagonal arches are naturally held in place by their joints normal to the arch; the four corresponding to the ridges are like-

likewise held by an oblique joint a, so that the last piece b of the ridge is longer on the intrados from e to f, than on the extrados from g to h. Yet this piece cannot fall, any more than those preceding it, since all are held and supported by the triangles of the fillings at the tail p. Fig. 32 allows one to appreciate the utility of the cusps that reinforce the junctions of the branches of the arches and of the ridges, thus preventing the ruptures produced at the crown and occasioning serious disorders in the vault. As always, the practical element, a necessity of jointing or of construction, here furnishes a motive of decoration. It is necessary to extend a little on t the Anglo-Norman system of vaults. This study is interesting because it shows how, in starting from the same point of the same principle, the two English and French systems have reached very different results, while both remaining rigorously faithful to this principle.

This is the best reply that can be made to those that regard principles as a restraint, and who on the contrary only believe that from their deductions can be derived new forms. [1]

Note 1.p.521. In Art. Construction we have already indicated the results derived by the Anglo-Normans from the vault of the 12 th century.

From the 13 th century was recognized in the construction of vaults the influence of Anglo-Norman or Anglo-Saxon genius, if one prefers, for our neighbors do not voluntarily adopt the name of Anglo-Normay. It is then understood that we shall not quarrel about a word.

We have seen that in France, or rather in Ile-de-France, already at the middle of the 12 th century, the fillings of cross vaults are closed by means of courses of roughed rubble set perpendicular (in horizontal projection) to the side aisles, so t that these courses of rubble join parallel to the line of the crown or ridge. To obtain this restlt, we have shown (Art. Construction, Fig. 55) how the detailer made on the extrados of the curve of the side arch and on the extrados of the curve of the diagonal arch an equal number of divisions forming the joints of the courses of rubble. Now since the curve of the diagonal arch is longer than that of the side arch can be, the divisions on the diagonal arch are larger, being in number equal to those of the side arch. In Normandy and on the other side of the

until about 1220, men proceeded in exactly the same manner; but particularly in England from the beginning of the 13 th century, was manifested an indecision in that mode of drawing the fillings of vaults; they evidently sought a more practical and more expeditious mode, and especially one that could be stated in a more distinct fashion. In fact the filling triangles of the French vault being concave, those courses of rubble could not be gene ally drawn on the diagram; they were set by the mason, who cut them to size as required by the plank centre mentioned in Art. Construction, an of which we shall soon speak, again. I was then necessary for the workmen charged with this need to be sufficiently intelligent, to have a sufficient initiative, to be able to arrange alone and without the aid of the master stonecutter those courses of rubble, concave on the intrados and consequently wide at the middle of the course than at the two ends. In that mode of procedure was a little "nearly so," a feeling that does not enter into the precise and practilal genius of the English, may one say, who claim to leave nothing to chance in the order of things, that can be materially foreseen and defined. Then to return to the subject occupying us, English constructors like our own, having adopted pointed arches for the construction of cross vaults, divide the side and d diagonal arches in order to turn the courses of rubble of the fillings, no longer into an equal number of divisions, but into equal divisions. Thus (Fig. 33) let this be a cross vault on a square plan; the revolution of the side arch being a b, and that of the diagonal arch c d, if each course of rubble gives on the side arch the divisions a e, e f, f g, etc., the same divisions are transferred to the diagonal arch from c to l, l to m, etc. Thus (these divisions being equal) there will be a greater number of widths of courses of rubble on the diagonal than on the side arch. Then joining the points e'l', f'm', etc., we shall have the directions of those courses of rubble that from o meet on the line of the crowys. The setter then only has to place rubble of equal widths; the lines of the joints will incline toward the diagonal arch, although the triangular surfaces pass through a series of horizontal straight lines. The triangles can be turned without centerings or even a plank centre, a wooden joist placed from V to X sufficing to receive temporarily the junctions of the last co-

courses of rubble. Not between two days did men reach this practical solution in England, and one finds experiments, of which it is useful to take account.

In the cloister of the abbey of Westminster (Fig. 34) these experiments are visible. Several vaults are closed according to the French method (see the triangle at A), and others present the projection C for the combinations of the fillings. This combination is obtained by the following procedure:- the angle a e f was bisected by the line a b, the courses of the opposite triangle have been turned perpendicular to that line a b; Those courses of rubble then interlock on the line of the crowns; or indeed as seen at D the courses of rubble intersect that line a'b' at right angles. This is the case of the example presented in Fig. 33. Also sometimes in other vaults, notably at Ely, the courses of roughed rupbble are set perpendicular to the branches of the diagonal arches as shown by the triangle G, and they always abut on the line of the crowns or are mitred. The vaults of the transverse aisle of the church of Westminster, that date from about 1230, are made according to the sketch indicated in triangle D in Fig. 33; i.e., the divisions are equal on the curve of the side arch F and on the diagonal arch O. (See perspective sketch P, Fig. 34). That arch having a greater length than the side arch, there are more divisions on the diagonal arch than on the side arch, and the slightly concave courses of rubble are inclined to that branch O of the arch. There is no transverse ridge to mark the abutting of the courses of rubble on the line of the crowns, but it already exists lengthwise from M to N as indicated in the Fig. The springing of the curve of the side arch being at R, i.e., much above the springing of the diagonal arches, there is then in g h i a vertical triangle forming a part of the load of the line i h to receive the course of rubble m (the first that begins the series of e equal divisions), the constructor has erected a trapezoidal s surface i h m n, warped (like the sail of a windmill). Only from the line m n were made equal divisions both on the side arch and on the branch of the diagonal arch.

It is easy to recognize that here the practician has had no idea other than to simplify his work by means of these equal divisions on the two arches, to place courses of rubble parallel in their extent, and thus to avoid the cutting of this rub-

rubble on the work, required by the French system. The results of the adoption of this simplifying procedure were not delayed.

The French vault has its fillings of fubble curved in all directions, concave surfaces resting their weight on stone ribs or permanent centres. Each triangle of the French vault is an independant cell maintaining itself. According to the preceding, one sees that the English constructors did not regard the traangular fillings as little vaults, but as panels, or rather as a series of centerings. In fact, admitting that one has set on the combined centres, such as the transverse, side and diagonal arches (i.e., each having their own curve) centerings of p planks, it is evident that these laggings of uniform width in their entire extend would give exactly the form represented in the sketch P (Fig. 34); that these laggings could not unite parallel on the line of the crowns of the triangle, but would abut.

Did the English make vaults originally composed of stone arches or wooden curves, on which they laid planks or lagging, in brief? This is possible; the core that there still exists in England in the cloister of the cathedral of Lincolnamong other examples, vaults constructed thus that date from the 14 th century. One should not lose sight of the fact, that wooden structures have from all time held an important place in English architecture, as in the architecture of all the races of the North.

The system of vault compartments with triangular projections in the French vault can nowise lend itself to the use of planks or timbers, since it would have been necessary to dress each o one of them to give it greater width at the middle than at the ends; while the primitive English system indicated above permits the cons ruction in wood; more it indicates that it is a result of that. The derivatives from the preceding examples also emphasize that preoccupa ion of the constructors. The English vault in the 15 th century comes to be a combination of carpentry rather than one of masonry.

After the 13 th century the ridge ribs appeared and than the extra ribs. The ridges were an entirely natural result of the abatting of the courses of the rubble on the line of the crowns. The ridges -- at least for vaults of great span -- were required to prevent the deflection of those courses of rubble that had an inappreciable rise and tha seem to represent lagging. These planes curved in one direction, but neither concave or very lit-

little so, -- since these courses of rubble fulfilled the purpose of lagging, -- needed to be supported at the middle of t their length, so as not to be deformed or deflect; the ridge r ribs were then set to avoid that accident.

Soon the consequences of this principle led to combinations of arches, whose analogie are not found in France; it is always a mode of simplification, that is the cause of those cominations.

All in the domain of architecture of the middle ages is so sligthly appreciated, even by architects, it must be confessed, that men hold to the appearance and judge of the methods adopted from that appearance, and do not take the trouble to examine if behind the visible form, there be a very simple procedure that directed it.

Already in 1842, one of the men in England most distinguished among architects occupying themselves with architecture, with the practical sense applied to everything in that country, Professor Willis, had published a very extended and learnedly deduced work on the construction of English vaults of the middle ages.[1] The work is perhaps the first serious study ever made of the system of construction of English vaults, and certainly the observations collected since have only confirmed the views of M. Willis. Yet having no point of comparison outside the English system, the learned professor could not entirely appreciate the practical side. Utilizing his remarkable work and our personal observations, we shall attempt to make it understood, how those vaults, apparently so complex, are the simplest deduction from the system, whose elementary principles we have explained.

Note 1.p.525. This work was inserted in the first volume of the Transactions of the Institute of British Architects, and w was translated in 1843 in the Revue d'Architecture (Vol. 4). In the introduction preceding the text of M. Willis, the translator does not emphasize the profound differences, that separate the structure of English vaults from French vaults, and d does not seem to have studied the latter; but in 1843 no person was in a condition to devote himself to a critical work on this subject.

Since to prevent the flexure of the courses of rubble regarded as lagging, the English constructors had judged it necessary to establish a ridge rib in each triangle of the vaults, abut-

abutting against the ridge rib of the crowns, it was natural f for them to establish several (Fig. 35).

The ribs extend from the springing to the middle of the ridges at a a′. These constructors judged that for the large triangles, the spacesa′b, a′c are still too great to omit an intermediate rib. Then they establish g h, g i, abutting the middles of the half ridges at h and i. Never forget that each course of the French vault has its particular curve, a portion of a circle with rare exceptions. Thus in conforming to that principle, if the English constructor must adopt for each of these ribs, -- all of which have different bases, -- a special curve, it would have been necessary to draw:- 1, the curve of the side arch g b; 2, those of the two ribs g a′ and g a; 3, that of the diagonal rib g o; 4, those of the two additional ribs g h, g i; 5, that of the transverse arch g l; seven curves in all. Further, admitting as in the French vault, that all these arches were parts of a circle, it would either have been necessary to place their imposts at very different levels, or that the crowns of these arches must themselves be at very different levels. In the first case there existed between the capital of the pier and the springing of the curve of the ribs having the least base, a vertical interfering with placing the rubble fillings according to the mode adopted by the English; the vault along the s side aisle seems no longer to belong to the construction but to be detached as may be seen in some of these primitive vaults, notably in the choirs of the cathedrals of Ely and of Lincoln. To avoid that inconvenience, from the end of the 13 th century the English constructors adopted a compound curve, so that all those curves start from the level of the capital of the pier and have the same radius.

Thus (Fig. 35) the diagonal arch being the longest curve, it is drawn by means of a first circular arc g′m, then a second c circular arc m n, the point n being fixed as the height of the vault under the crown. It is well understood, that the centre of this second curve is found on an extension of the line passing through the point m and the centre e of the arc g′m. The curve of the side arch g o g′ is given by the same radius e m. this being done, all the curves of the other ribs are given. All have a base shorter than that of the diagonal rib. Then projecting the rib g′h on the line g′c of the base; erecting

a perpendicular from this point h′, it will cut at h″ the master curve g′n. The curve of this rib will then be the curve g′h″. Projecting the rib g′a′ likewise to a′; erecting a perpendicular at that point, it cuts the master curve at a′″. The curve of this rib will then be the curve g′a″. Projecting the second rib g′i to i′, erecting a perpendicular at that point, it cuts the master curve at i″. The curve of the second rib will then be t the curve g′i″. Proceed the same for the rib g′a of the long t triangle, whose curve is given by g′p; also the same for the transverse arch, whose curve will be g′g.

These crowns all attain different levels. To draw the transverse ribs c b, it will suffice to erect perpendiculars from the points h, a′, i, c, on the line c b (horizontal projection of this transverse rib), and to take on these perpendiculars distances equal to h′h″, a″a′″, i′i″ and c n, which give the points r, s, t, u, of the intersection of the ribs with the transverse rib c b. If one desires the side arch to have the same curve as a, the other arches, he will proceed as before. We project the line g′b on the base g′c; from the point V we e erect a perpendicular to cut the master curve at V″, giving the curve g′V″ of the side rib. This curve in transverse projection will give the height b V″, while the side rib, revolved in g o, will give the height b o′. Employing the same method of drawing, we shall have in u y the longitudinal projection of the branches d l of the ribs.

All that is only very elementary descriptive geometry, and demands no great effort of intelligence on the part of the draftsman, but the consequences are important from the point of view of the construction. First, since we have only a single compound curve for all the ribs; or rather all the ribs are only longer or shorter segments of the same compound curve, the template for cutting one rib serves for all the ribs; further, the ribs in swinging around the vertical erected in the axis of the pier g, must necessarily pass through the same curved surface, since all have the same curve, giving to the extrados a concave conoidal form like the bell of the trumpet, which singularly simplifies the setting of the rubble of the fillings. So much (Fig. 36) that in drawing the horizontal projection of this vault, one sees how easily can be set the courses of rubble fulfilling only the functions of planks or boards placed

between the ribs of carpentry. But the series of logical deductions, that had brought English constructors to these multiplied arches as ribs of carpentry, led them (because of the small curvature of these ribs in the upper part of the vault) to connect them by bosses and cross ribs, as indicated in Fig. 36.[1] The intersections of the cross ribs with the ribs give motives for bosses, that also strengthen the junctions. Thus one obtains a resistant network of ribs strongly braced, on which can be placed the rubble filling as one lays planks on a framework of carpentry. Fig. 37 gives the perspective sketch of one of those bosses (A in Fig. 36). The cross ribs are drawn in a vertical plane, as indicated in the section B (Fig. 37), rebates F being made for setting the rubble filling, the tops of these ribs being flush with the extrados of this rubble. One notes that the rib C (here the diagonal rib) has at D a band much wider below the cross rib than at d, caused by the vertical position of that cross rib, and which is perfectly according to the conditions of resistance of these ribs, that no longer require as much strength where they join the framework as where they are below it. Returning to Fig. 36, we see that the bosses A, B, C, are set in a circle with its centre D; so that the branches D C, D A, D B, of the ribs are identical. The bosses E, C, F, divide the branch of the transverse rib into four equal parts, as the boss G divides the longitudinal rib into two equal parts. The boss H divides the branch A O into two equal parts, and to place the boss I, the points B, H, A, K, are joined by lines, as one sees at M. These two lines cut the rib at two points a and b; bisecting that distance a b is marked the point P, centre of the base I.

Note 1.p.528. Hall near the cathedral of Ely, north side, 14 th century.

Multiplying thus the arches of vaults intended to support the fillings, that are only stone panels, it was natural to construct these arches themselves entirely different from the arches of French vaults.

The arches of French vaults are properly turned with voussoirs having small thickness between their beds, i.e., that in an arch of a French vault, the constructor has multiplied the joints, so as to leave to that arch a greater elasticity, to avoid the effects of fractures, that would have been a cause of

dislocation of the vaults. Although those panels themselves retain a certain elasticity, it was important to preserve from sensible deformation the permanent centres (arches) that support them. By turning these arches with thin voussoirs and multiplying the joints, the French constructor considered with much justice (that admitting movement and deflection), the multiplicity of the always thick joints, allowed the arch to follow t these movemen s or settlements without deforming its curvatwre. But from the instant tha the English filled the spaces with stone panels, and that they adopted curves composed of two segments of circles, one of which had a very grea radius, it would nave been dangerous to turn these arches with thin voussoirs. Thus when the English vaults are made according to the drawings just given in the last place, on the contrary the arches are composed of long pieces of stone as would be carpentry curves. The ribs or cross ribs, which are struts, are often cut in one piece of stone from one boss to another. This method was a result of the system of vaults adopted by these constructors of t the end of the 13 th century.

From all the preceding it results that the English construcors, in spite of the apparent simplicity of these Figs., on t the contrary adopted a simplifying procedure, both for drawing vaults and for their construction. It is interesting to observe how our neighbors were already permeated by that practical spirit, that tends to converge common efforts to one aim, leaving little to individual iniative. It is evident that to build a French vault at the same epoch, i.e., during the first half of the 14 th century, it required on the part of each workman more intelligence and initiative, than was necessary to construct a vault like that just analyzed. The diagram made according to the last method, the need for workmen to restrict themselves to a sort of mechanical work. It was then not so with our vaults, which required during the setting of the combinations, that the master must direct step by step, but could not draw generally, that the mason could only execute by an effort of his intelligence. We believe that there is more art in our vaults, so simple in appearance, that one could find in a purely geometrical system, very simple as a practical procedure, bu so complicated in appearance. The geniuses of the two peoples thus show themselves on both sides with their qualities and their defects.

Yet one is not surprised that men who already possessed a collective and simplifying spirit so manifest, were equally permeated by that feeling of discipline and of order, that was so fatal to us on the days of Crecy and of Poitiers. All holds together in the history of a people, when one desires to see it closely, and this is what makes the study of hhe art of architecture of those times, so entirely impressed by the genius of the peoples that practised it in France and England, an inexhaustible subject of interesting observation.

We have seen in Fig. 35 how the English constructors, having adopted a single compound curve for all the arches of a vault, even sometime applying this curve to the side arch, and consequently to the archivolt of the window opened beneath that side arch. This is a simplifying procedure in the construction of vaults, that requires only a single diagram for all the arches, and which explains why many of those archivolts of windows belonging to edifices vaulted in the 14 th century are obtained by means of compound curves. In this form observed by all those that have visited England, there is not a caprice or question of taste, but the rigorous application of a system followed, as we have just demonstrated, with a mind rigorously methodical in its deductions. Once the curve was accepted from the necessity of construction, men accus omed themselves to it, and used it in circumstances not required by the system of construction.

Yet the English constructors did not adhere to the vault, to that we have just given (Figs. 35, 36); they claimed at about the same epoch, i.e., about the beginning of the 14 th century, to have with arches formed of compound curves, ribs on a horizontal plane and no longer inclined to the side and transverse arches. Here (Fig. 38) is how they undertook to arrive at that result. Let A B C D be a quarter of the cross vault, one rib being drawn at A E. For the springings of all these arches, i.e., of the side arch A B, the rib A E, the diagonal rib A D, and all the other arches, if one pleases to trace others, as in the preceding example of a single arch A F has been drawn with centre o. Projecting the length of each arch on the line A C regarded as base, and erecting perpendiculars to the base, from these p projected points, the line a b being regarded as the level to which each arch must attain, and one draws the segments F a, F g, taking their centres at m and n on the line F o prolonged; the segment I h with centre r on the line I o prolonged; the

segment K b with centre q on the line K o prolonged. The crowns of all these arches are in the same level plane, and consequently the ribs C D, C B are horizontal. Yet the imposts of these arches all have the same curve, at least to the point K, that avoids the difficulty where the curves are different. Once this level K is passed, there is so little difference in the curvatures of these arches, that the courses of rubble filling can always be set according to the method indicated before.

Let us see (Fig. 39) how thi system of construction of English vaults inclines to a method more and more mechanical. Let A B C D be a quarter of a square vault, and E B F G a quarter of a rectangular vault. In the first the diagonal arch is the arch A D; in the second the diagonal arch is the arch E G. Having admitted as shown in Fig. 36, that the ribs must be multiplied, so as only to regard the fillings as panels, no longer as little vaults, it naturally follows that these panels must be of similar extent, as far as possible. To draw the ribs, the ridges will no longer be divided in equal parts as in Fig. 36, but we describe the qsadrant B C for the quarter of the square vault, and divide this quadrant in equal parts. Drawing the l lines A a, A b, A c, through the dividing points, we shall have the horizontal projection of the ribs of one eighth of the vault. Hence the angles D A a (A being vertex), a A B, c A C, will be equal, and the panels comprised between their sides are similar. We brace these ribs by the cross ribs, e, f, g, h, as in Fig. 36, but so drawn here that their junctions are found on the quadrants B C and e i. Either we wish to adopt for all these ribs a single and even a compound curve, as in Fig. 35, or we desire that the ribs B D, D C, be level. In the first case we take the diagonal rib A D as being largest, we project it on the line A′D′, erect the perpendicular D′D″ (D″ being the height of the vault under the crown), and we draw by means of two centres the compound curve A′D″. Proceeding as stated above; taking the lengths A a, A b, A c, A C, and transferring them to the line A″D′ at A′a′, A′b′, A′c′, A′C′, and from these points a′, b′,c′, C′, erecting perpendic lars to th line A′D′, these perpendiculars cut the curve A)D″ at points which give the heights beneath the crown for each of the ribs A a, A b, etc., and consequently for the rib D C the vertical projection C‴D‴. But if we claim to place these cross ribs level, it is necessary fo

us to seek the curves A'K, A"l, etc. by means of procedures indicated in Fig. 38, always retaining for the imposts the same curve A" n.

If it concerns a rectangular vault, whose quarter is E B F G, we proceed in exactly the same manner as for the square vault; only the side rib E F and the ribs joining this side arch being much shorter than the side arch and ribs A a, A b, A c of the square vault, the crowns of these ribs will be lower (assuming that we adopt only a single curve) than in the square vault, i.e., that the high points of these curves will be at m for the side arch E F, at o for the rib E o', at p for the rib E p', at q for the rib E q', etc., and that the line of the ridge F G will give the vertical projection F'D". But if we desire the ribs of this rectangular vault to be level, then it will be necessary to seek compound curves as above, and the curve of the side arch E F revolved at A I will always retain a part of the lower primitive curve from A" to s for the imposts.

Thus one sees how are given, by the application of a principle of construction rigorously deduced, those lowest arcs A'I or depressed compound arcs A m, so frequently adopted for the windows of English vaulted naves, those windows being circumstribed by the side arch. Yet for those curves generated quite naturally by a procedure of construction, men have desired to find more absurd origins. Those curves pretend to imitate the mitre of a bishop, ir indeed they have a mystical-symbolical signification; in approaching the straight line above a certain point, they should indicate the disposition of the Christian soul that becomes stronger as it rises toward heaven! But we shall not report those dreams of so many authors, that have written on the architecture of the middle ages without having a their service the first elements of geometry and of statics. It is clear that artists who are wearied by all reasoning, and that would be easy if all reasoning were forbidden, even in architecture, by a good and well made law, and in particular if religiously applied, and who are earnest in repeating these puerilities concerning Gothic construction, and prefer rather to see the imitation of the mitre of the bishop in a curve than a principle of construction: in this case the mitre of a bishop or the aspiration of the soul dispenses with all study and all discussion, and the Gothic vault thus passes into the account of human nonsense;

which simplifies the question. When a single curve serves for all the ribs of a vault, and if these arcs rotate around the supporting pier, it is clear that above each pier, each part of the vault will give exactly the form of the bell of a trumpet. [1] When the upper part of these compound curves is alone modified, so as to set all the crowns and ribs level or in the same horizontal plane, the bell form no less exists to a certain height above the springings, and the variety of the upper curves modifies slightly the form of the bell, but cannot destroy it to the eye. It is also clear, because of the adoption of these radiating ribs with equal angles between them, whatever the arrangement of the bays, square or rectangular, that the architects must abandon the diagonal arch, and give to all those radiating ribs fulfilling a similar function, a similar section. That is what occurred. It was accordong to the logical advance of the procedures adopted by English constructors, no longer to place between these ribs courses of rubble, on to replace them with slabs, actual stone panels. This system was adopted on the other side of the Channel from the 15 th century, both on ribs arranged like the bell of the trumpet, and on ribs forming a series of curvilinear pyramids with a part of a tunnel vault. Thus was constructed the vault of the chapel of S. George at Windsor. [2] Fig. 40 shows the extrados of one of those pyramids; how are arranged the ribs and rabated ribs A, and how the filling panels B fit in these grooves. The ribs comprised between the diagonal ribs O and in the level line D D′. From this line to the line C C′ of the crowns, the vault forms a tunnel vault composed of stone panels with radial joints, bearing in relief compartments there imitating intersections of groin ribs, ribs and cross ribsl etc. The line of the crowns or the rib that connects the crown E of the side arch with the line D D′ is horizontal, so that the ribs between the diagonal ribs O and the side arches are cut on different curves; likewise for the ribs comprised between the diagonal ribs, according to the method previously indicated. Thus in this vault of the chapel of Windsor, several systems have been employed; the system of vaults as portions of curvilinear pyramids, with ribs made on different curves (except for the imposts); the system of long voussoirs of small width, like slabs with radial joints, completing the vault by a tunnel vault in its upper part. Also later

the ribs are suppressed and the English vaults only consist of masonry in large slabs with ribs projecting below and cut in their mass, still imitating the structural arches that no longer exist in fact. Thus are constructed the more recent vaults of the cathedral of Peterborough, and those of the chapel of Henry VII at Westminster.

Note 1.p.535. To this form has been given the name of fan vault; but a fan extends in a single plane; it is unnecessary to emphasize the lack of precision in that name.

Note 2.p.535. See the Memoir of Professor Willis; On English Vaults of the Middle Ages, or in Vol. IV of M. Daly's Revue d' Architecture, the translation of that work with the plates.

Those kinds of vaults are very flat. Thus the vault whose extrados is presented by Fig. 40 has only a rise of a little more than one fourth its span. That alone indicates the advantages which one could derive froc this mode of construction.

We have believed it necessary to enlarge somewhat on the combinations introduced by the English constructors in the forms of vaults so different from ours in appearance, although starting from the same principle. This digression tends to demonstrate, that from the same principle, when followed systematically, can proceed very varied deductions. It is certain that from the generating principle of the Gothic vault can be derived yet o other results, that consequently there can be no good reason to reject this principle, excellent in itself, and leaving to the architect the greatest liberty in applications that can be made, according to the programmes, resources, nature of the materials and economy.

Let us return to the French vault. We left it at the moment, when having reached its development, it allowed the covering of all possible surfaces by the aid of arches or permanent centres supporting little vaults of roughed rubble. Having reached at the middle of the 13 th century a degree of absolute perfection, according to the method accepted from the middle of the 12 th century, the French system is no longer modified; it always proceeds from the transverse arch, the diagonal and side arches with or without additional ribs. It is only in the more northern provinces, and notably in Normandy itself, that the use of additional ribs became frequentafter the end of the 13 th century. In Ile-de-France, Champagne and Burgundy, the con-

constructors adhered to the diagonal and transverse arches until the end of the 15 th centcry. From this point of view as a procedure in construction, the French vault was not modified. The improvements or innovations -- if one can term innovation the logical consequence of a system first adopted,-- only concern the springings of these vaults. We have seen that in England by means of compound curves men avoidid the difficulties resultiug from curves of different radii for turning the fillings, since in these English vaults after the 14 th century, the lower curve is the same for all arches of the vault. In France with ver rare exceptions, which belong to an epoch relatively recent, the compound curve is not employed, the side, transverse and diagonal arches each having their curve, which is always a circular arc. As men felt more and more the necessity of placing the crowns of those arches at the same level, so as not to lose space and to be able to pass the tiebeams of the carpentry directly above the extrados of the vaults, when These arches had very differen spans, it was necessary either tha their junctions should have very different angles, i.e., some very acute and others very obtuse, or that the springings of those should bie placed at different levels. [1] The last method prevailed, for the constructors sought to give to the pointed arches of the same edifice -- at least for the transverse and side arches, and the archivolts, angles at the crowns not too unequal. The springings of these different arches were one of their greatest difficulties.

Note 1.p.538. On this subject, see Art. Construction, Chapter Voute.

The choir of the cathedral of Narbonne, commenced at the end of the 13 th century and evidently conceived by a very skilful master, presents precious data in relation to the construction of the vaults. [2] The last pier of the bays parallel to the axis of the choir, that commences the radiating bays, is arranged r rigorously and the most economically possible to receive the arches it must support. Fig. 41 gives the horizontal section of this pier below the vaults of the side aisle. The archivolt of the part parallel to the axis of the choir occupies the entire width a b, and that of the first curved bay of the same wi width a′b′. This archivolt has the entire thickness of the pier within some inches. The little column C rises to the high vault

to bear a single arch (Art. Cathedrale, Fig. 43), since we are in the curved part of the choir; the little column D supports at once the transvere arch A and the two diagonal arches of t the curved side aisle. The bays T being narrower than those T' parallel to the main axis, it results that the vertical rib G, that receives the principal round G" of the archivolt, finds itself in the curved bay T behind the face H and does not appear. These are the arches that rigorously gave the positions of the ribs and little columns of the cylindrical pier. If we show the vault of the side aisle (Fig. 42(with one of the piers of the curved portion, we see how the archivolts penetrate into the pier, and how the transverse and diagonal arches of the side aisle, because of their greater spans, have their springi-ngs placed below those of the archivolts. We see how are drawn those diagonal arches according to a curve in their horizontal plane. Fig. 43 explains this drawing. At A are the great piers of the sanctuary; at B are the entrance piers of the chapels. The crowns C of the diagonal arches are placed at the middle of the line a b of the crown of the little filling vaults, that c connects the top of the transverse arch at the entrance of the chapels with the top of the archivolt. So as not to have too acute an angle at e, the constructor has given in horizontal projection a curvature to the diagonal architrave C. Thur the fillings are more equally established in the two adjacent tri-angles having as bases the transverse arch of the side aisle and the transverse arch of the entrance to the chapels. At the cathedral of Bourges, the vaults of the side aisles of the cho-ir (about 1225) are already drawn on that principle.

Note 2.p.538. Art. Cathedrale, Fig. 48. The cathedral of Nar-bonne i singularly poor in sculptures. It seems that the mast-er of the work concentrated all his resources to obtain a cons-truction irreproachable in conception and execution.

But we see in the perspective of Fig. 42, that before the d diagonal arch and the archivolt the filling is abandoned and even penetrates the pier itself, continuing above the ring for-ming a capitol. There is an incomplete point, for the filling vaults must always rest ou the extrados of the arches. In the 14 th century, the constructor of the abbey church of S. Ouen of Rouen takes a franker and more logical method, although more complicated in appearance (Fig. 44). The archivolts occupy the

entire space a b, i.e., exactly the width of the pier less the rib C, intended to receive the transverse and diagonal arches of the high vaults, and the profile of these archivolts is only that of the pier, or to be more exact, the section of the pier is only the section of the archivolt. The transverse arch of the side aisle is likewise only the profile of the pier, a and the diagonal arch has the profile n. In elevation these a arches penetrate each other as indicated by the prespective v view. There is no longer a capital, since there is no reason for it, and the imposts with horizontal beds rise to the level N, i.e., much above the springings of the arches.

Thes is the final expression of the combinations of the springings of the arches of vaults in France, and this system was f followed until the epoch of the Renaissance. These are rigorous consequences of the principle of the vault discovered in the 12 th centurw; but as for the mode of construction, it does n not varw, i.e., the arches always fulfil the functions of permanent centres receiving little filling vaults between their branches, little vaults that never become panels, but are constructed of little voussoirs with curved courses always starting from the transverse, side arch, or archivolt, to rest askew at the other end on the diagonal arches.

In Art. Constructionit is stated how by the aid of this system of vaults, one can cover all surfaces, however irregular they may be; how one can make skew, rampant or warped vaults without difficulties in jointing, etc. This French system is thus essentially practical; it presents an improvement on the Roman system, and consequently it was more reasonable to improve it further, than to abandon it and resort to the Roman method. But the infatuation of the 16 th century for the Italian arts among us vanquished the reasons that militated in favor of our system of French vaults, from which it was easy to derive results more and more extensive. Philibert de l'Orme in his Traite d'architecture, [1] expresses himself on the subject of these vaults:- "Those forms of vaults have been found very beautiful, and are seen well executed and constructed in various places in the kingdom, notably in this city of Paris, as also in several others. Today those having some knowledge of true architecture no longer follow this fashion of vaulting, called by workmen the French method, that truly I cannot scorn,

but rather confess that it has been made and practised in very good and difficult designs. But forasmuch that fashion requires great expense, i.e., great strength to abut it and make the f flying buttresses, so as to hold the work firm, as one sees in the great churches, at the end of this present chapter, I shall describe a vault wit its supports, such as you can see under the form of a perfect square, as large on one side as on the other, where you will note the crossing of the diagonal arches, etc." Thus whatever can be claimed by the more or less official criticisms of our Academie des Beaux Arts, still in the 16 th century those vaults were regarded as French (by workmen, it is true; but in the matter of traditions the language of workmen is most certain). Now as the architecture of the middle ages is derived in great part from the system of vaults, it is necessary to take its part, and admit that we had an architecture recognized as French from the 12 th to the 15 th centuries. But the text of Philibert de l'Orme is interesting for more than o one reason. Our author admits that those having some "knowledge of true architecture no longer follow that fashion of vaulting," and the first example that he gives of a vault suitable to cover a vast nave, after that preamble, is a Gothic vault with d diagonal arches on a square plan with ridges and ribs. As for the examples that he furnishes "at the end of his chapter," those are traces of spherical vaults penetrated by a rectangular plan, vaults that cannot be made of great dimensions, which are difficult in jointing and expensive, are very heavy, and thrust much more than Gothic vaults. And in fact until the beginning of the 17 th century, French constructors, whatever "knowledge " that they had "of true architecture," continued to build vaults over wide naves on transverse and diagonal arches; the church of S. Eustache at Paris is the proof of this, a and it is not the sole example. Practice was then stronger than theories on "the true architecture," and having found nothing better, they continued to employ the old method until the moment -- and that under Louis XIV alone -- when were adopted for great naves stone tunnel vaults with penetrations, as at S. Roch of Paris, the chapel of Versailles, the nave of the Invalids, etc.

Note 1.p.543. L'Architecture of Philibert de l'Orme. Paris. 1576. Book IV. Chap. 8.

Now this sort of vaults is a step backward, not an advance.

Tunnel vaults have a continuous thrust not concentrated at isolated points: they are very heavy if of stone: their effect is not happy, and the penetrations of the openings in their sides produce very disagreeable curves, that the Romans justly avoided when they could.

One then sees appear in the naive text of the good Philebert de l'Orme this feeling of rejection, though with regard to the procedures of the middle ages, which has been developed since him with less good nature. In fact in the margin of the text just cited, there is stated as a guard:- "The author approves the modern fashion (de l'Orme so designates Gothic vaults) of vaults, always not desiring to use them." Why, since he approves them? He does not say. Whatever this may be and why he would not use them, he constructed cross vaults like all his colleagues, and he was right, for most of the examples that he gives contain novelties, that are neither practical nor serious, if it concerns the covering of great spaces. In that Philibert de l'Orme preludes the criticism of the construction of the middle ages (if we can give this name to irrational reproach.). Since him that criticism reasons no better, although less naive; but it is still more exclusive, and in speaking of the fashion of vaults of the middle ages does not say, "which truly I cannot disdain, but rather confess that men have made and u used very good anf difficult designs." Those things are no longer admitted in the 19 th century, because the logical minds of our time could reply:- "If you confess that the system is good, why do you not use it?" Better say nothing or beat the water, than to raise such questions.

Whatever Philibert de l'Orme says of it, the Renaissance then does not change the system of vaults for great naves, because it would complicate this system. It multiplied the secondary m members rather as a motive of decoration than to obtain more stability. In fact the vaults that it built are in a very bad state or even have fallen, while the duration of the vaults of the cathedrals of Chartres, Rheims or Amiens, will yet defy m many centuries. The high vaults of the church of S. Eustache of Paris were only built during the last years of the 16 th century, and are not very stable; their imposts are not skilfully combined, the arches are turned with s ones of unequal height between beds, which is one cause of deformations, as previously

stated. Among those vaults dating from the 16 th century may be cited as remarkable, those covering the choir of the church of S. Florentin, and which date from the middle of that century. [1]

Note 1.p.344. The flying buttresses that abut those vaults are badly combined, as occurs to nearly all flying buttresses of that epoch; then the external surfaces of the buttresses have been undermined at various times; some settlements were produced. Twenty years since, those vaults threatened ruin and it was necessary to rebuild them. M. Pieplu, architect of the department of the Yonne executed this work with much skill several years since; but for reasons of economy, they were satisfied with simple cross vaults. We give here the old ones, drawn before the demolition.

We give (Fig. 45) the horizontal projection of half of these vaults with the apse of the church. The transverse and diagonal arches form the principal skeleton of the structure, as in the vault of the middle ages; but the ribs extending from the pier to join the middle of the ridge no longer exist here, and are replaced by intermediate ribs a b, that produce a piquant ornamental effect, yet are wrong in transferring a lateral thrust to the sides of the side arches, which is absolutely contrary to the principle of the construction of Gothic vaults, and to good sense, which is worse. That thrust is also increased by the ribs a d, which themselves abut th ridges d e. So those side arches (revolved into A A'B) were inclined to the exterior under the pressure of those arches that push them at a'a", which would not have occurred, if instead of those ribs a b the architect had placed diagonals A d; but they would not have had this compartment in star form, and the desire to produce a novel appearance overcame wha reason directed. One sees then that already is manifested this tendency, now so developed in architecture, to sacrifice the true, the wise and the reasoned, to a form resulting from the caprice of the artist. Many other shocks to reason are found in this vault. Thus we have revolved the transverse arch A C and the diagonal arch to A F; the great arch A D abutting the crown of the chevet to A G. The junction of this great arch A D with the diagonal arch gives t the crown H; now as this diagonal arch is drawn, the level of this crown H is given and is found at h. We transfer that level to h' on the revolution of the arch A D. The level of the crown

I is given; it is the same as that of the crown H, since the diagonal arch A E is drawn. Then it is necessary for the arch K I to attain that level I; we revolve it to K L i, the rise I i being equal to the line I h. Revolving on the circular arc the crown O, we obtain the point o′, and the height O o′ gives on the curve K i as well as on that of the great arch A D, the level of the crown O at O′ and at o″. Then it is necessary for that great abutting curve A D to pass through G, h′ and o″. From o″ to G ih evidently approaches the horizontal too nearly, and badly abuts the junction of the diagonal arches and ridges of the chevet; so that branch of the arch o″G was twisted and raised, because the great transverse arch K L was deformed.

The crown B being given in horizontal projection, its level is given at b′ on the revolution of the arch; the junction a on the side arch being given in horizontal projection,its level is given at a″ on the revolution of the side arch, and then the l length a b in horizontal projection; the arch a″b″ is known. It is the same for the arch b n, revolved to b″m′, since the level of the crown m is known.

As for the ridges d e, thew are taken or a circular arc, joining the crown P of the side arch to the crown e of the diagonal arches. That arch of the ridge is revolved from n to s, n giving th level of the crown P of the side arch in relation to t the level of the crown e of the diagonal arches. At V are revolved the diagonal arches p q of the chevet (the level of the crown being that of the transverse arch), the branches of the ribs in r o and the ridges in p s. All these arches, ribs, false ribs, false ridges, are placed in a vertical plane, whatever their position in relation to the curvature of the principal arches (see at P).

But the secondary arches intersect more or less obliquely the principal arches, according as those approach or leave the vertical, and the sides of those secondary arches being set in a vertical plane, one is found above and the other below the extrados of the principal arch; there resulted from this a difficulty in building the compartments. To avoid the difficulty, the architects of the Renaissance designed a pendant boss at those junction points (Fig. 46); [1] a pendant boss composed of a cylindrical body penetrated by these different arches. [2]
Like the principal arches, the secondary arches being placed in

a vertical plane, the extrados of the false rib A strikes horizontally against the cylindrical body, while the extrados of the diagonal arch B penetrates at b on the side next its springing, and at c on the side next its crown; then there will be a difference of level between the point b and the point c. And from b to c, how to set the rubble filling? The constructors then increased the height of the sides of the principal arches on coming near these bosses as indicated by the addition g to reach the point e, this because of the levels of these junction points of the ribs, false ribs and false ridges. For example, there would be a difference at h at the junction of the diagonal arch B, since the extrados of the false rib l does not reach the level of the false ridge A. One sees what complications in cutting are produced by those caprices of the architects of the Renaissance, much more occupied in obtaining an ornamental effect than by the traditions of wise construction. If we add to those difficulties gratuitously accumulated, the lack of knowledge of geometrical drawing, that already made itself felt in the workyards, we shall not be surprised by the brief duration of these vaults of the 16 th century. Still one recognizes that the habit of reasoning on the application of forms suitable for the purpose is not yet lost among the masters. Thus the elongated shape of these pendant bosses is indeed produced by these penetrations of arches at different levels. These long stones that seem to the eye to be pegs placed at the intersections of arches, are not there by a caprice of the artist, but by a necessity of construction, and the pendants more or less ornamented by sculptures that the artists gave them below the arches, only emphasize the function of these bosses at the junctions of arches.

From the point of view of construction, the art of the 16 th century was in a state of inferiority to the preceding arts, for the vaults as for the rest. For example, the flying buttresses at that epoch are no longer arranged according to the laws of statics and of equilibrium of forces (Art. Arc-Boutant); the archivolts no longer have regularly cut extradosses, the beds of the courses no longer correspond to the architectural members; the openings of the tracery adopt forms contrary to the nature and resistance of the materials employed. It is evident that the architects first of all are occupied in applying

certain forms belonging to a mode of construction differing fr from that adopted in France in relation to the materials and their judicious use, abandoning to subordinate hands the drawing of that masonry, which is not in accord with these forms borrowed elsewhere. The masters of the 15 th century being better constructors, practicians and draftsmen, than those of the 16 th; those of the 14 th excelled those of the 15 th, and those of the 13 th were perhaps still better than those of the 14 th. Yet the detailers of the 16 th century were geniuses, if we compare them to those of the 17 th century, for there is no ruder and more badly drawn structures in France, than those of the 17 th century, unless we return to the worst epoch of the Romanesque school, and yet men compel themselves to imitate them today.

French and English vaults both started from the same point in the 12 th century, but in both countries had reached very different results in the 16 th, that give an accurate measure of the aptitudes of the two peoples. According to what we have already seen, one will observe that in perfecting themselves a according to the method adopted after the 13 th century, the English vaults, in spite of their apparent complexity, had reached in both countries very different results, in that one c curve could suffice for all the arches of a vault, or that (if these curves must reach a crown at the same level), the curves differ only in one part of their development, and are drawn by a very simple procedure; that all those arches remain independent, and are only connected by ribs in a single piece, that have only a secondary purpose, and cannot influence in any wise the principal curve adopted for the arches; that the fillings are no more than panels, as easy to draw as to set. In French vaults we see that their constructors multiply the arches; then cross them so that the curvatures of these arches must differ for each one; that the curvatures are determined by the levels given by the preliminary drawing on the horizontal plane; that those arches are dependent on each other, and that consequently those constructors are no longer masters, to give these curves the rises necessary for their functions, their resistance or their effect in thrust and abutting; that in a word, these French constructors abandon the judicious and perfectly understood system (that of the 13 th century), to enter on combina-

combinations indicated only by caprice. The framework of the E English vault of the end of the 15 th century is solid and systematic; it is the result of long experience faithful to the principle adopted. The framework of the French vault in the 16 th century is not solid, because the arches intesect according to a caprice of the artist without necessity of reason, and act differently, some being inert and weak, others active and strong. Instead of rendering the French cross vault more stable than it was, by the addition of all these secondary arches, the French architects alter it and take away its properties of elasticity, strength and freedom. Thus these vaults of the 16 th century mostly approach their ruin, when they have not already fallen.

Then in the 16 th century our architects sought by the aid of mediocre knowledge to make surprising things, and in spite of his rare merit, Philebier de l'Orme himself is not free from this caprice. Pedantry is introduced into art, true and practical knowledgeis lacking. Men desire to forget, and do forget the old methods, principles based on long experience; methods and principles that could be perfected without adopting pu puerile and very superficial theories. It is not doubtful, by only examining the existing monuments, that the masters of the 13 th century knew geometry, and understood its applications in particular, much better than the masters of the 16 th century. But the former did not amuse themselves in showing this, they employed the science like true scientists as they were, as a means and not to make a parade of it. The architects of the Renaissance already took the means for the end; and as always happens in such cases, there was a class of speculative theorists, tolerably pedantic, and behind it a compact mass ignorant of the simplest procedures. In the 16 th century were made books in which were discussed Vitruvius well or badly, where were given the proportions of the orders, and where p pages were covered by sketches intended to dazzle the vulgar, but men tended to construct very badly and rudely in a country where the art of construction had attained a prodigious development, first as a science and then as a reasoned use of materials and their properties. Art escaped from the hands of the people, from these guilds of artisans, to become the property of a sort of aristocracy and less understood, because it left

aside the principles derived from the genius itself of our country, for a sort of empirical formula, unexplained and inexplicable like a revelation. It was evident that all who could attempt to discuss this formula presented as a dogma, must be repulsed by that aristocratic body of new masters, whose doctrines are still pursued today more rigorously than ever by the Academie des Beaux Arts. That is why we see at various times, there escapes from its most enthusiastic adepts a protest against the study of our French art of th middle ages, and ef extended a applications that could be made of it. That is also why we do not, and never will, cease to endeavor to develop this study, to cause its applications to be shown, well convinced of that truth affirmed by history; that bodies are never more exclusive than in the days when they feel their power shaken.

YMAGERIE. See Art. Sculpture.

YRAIGNE. (Old Word).
Panel of wirework. (Art. Grillage).

YRE. (Old word). Court. Area.

ZIGZAG. Art. Batons rompus. (Chevrons).

ZODIAQUE. Zodiac.
Zone of the ether that the sun seems to pass through in the space of a year, and whose ecliptic is the median line. No one is ignorant that the zodiacal zone was divided into 12 parts from the highest antiquity, one for each month, each of those parts bearing a sign called the signs of the zodiac. Those signs of the Ram (March), Bull (April), Twins (May), Crab (June), Lion (July), Virgin (August), Balance (September), Scorpion (October), Archer (November), Aquarius (December), Capricorn [redacted]), and Fishes (February). Those figures corresponding to the months of the year are frequently represented on our monuments of the middle ages, and opposite them are represented the labors or occupations of men during each of those months.

After the 11 th century the portals of our churches have zodiacs carved on their archivolts of the doorways.

Our great cathedrals of the 12 th and 13 th centuries are all

provided with these signs, always sculptured in a very visible manner.

At the principal portal of the abbey church of Vezelay (first years of the 12 th century), the band of medallions surrounding the great tympanum representing Christ and the 12 apostles, contains the 12 signs of the zodiac alternated with the corresponding labors of the months. This zodiac is one of the most complete that we know. The right doorway of the facade of the abbey church of S. Denis still exhibits on its jambs some subjects and signs of the zodiac, that might be complete, but has been partly destroyed. In that zodiac, the medallion corresponding to the first month of the year represents a man with two heads, one old and the other young. At the side with the head of an old man, the arm pushes a little bearded figure into a little structure whose door closes; that is the year ended; the other had leads a little beardless figure from a little building whose door opens; this is the year commencing.

At Notre Dame of Paris on the jambs of the doorway of the Virgin on the western facade is sculptured a very beautiful zodiac, whose subjects and signs are in the best style. This zodiac dates from about 1220.

Zodiacs are often represented in painting, on the glass of rose windows of our great churches of the 12 th and 13 th cents.

Zodiacs were likewise represented on pavements. The church S. Bertin of S. Omer, that of the abbey of S. Denis, that of the abbey of Westminster, possessed and still have in part zodiacs in mosaics or in inlays of colored cements in incised slabs. Sometimes these are only the labors or representationr of the occupations of the year (as at the chapel of S. Firmin at S. Denis), which replace the signs. There is a man cutting wood, another hunting, a third prunes his vine; ther come the months of the fine season; a reaper, a harvester, a thresher in a barn, a vintager, etc. Sometimes in edifices of a civil character, l like castles, mansions and even houses, pleasures replace the labors. Certain months are reserved for banquets, for games; persons warm themselves before a fireplace, young people plait crowns. Men hunt with falcons or nets; they fish and they dance. As today, there was then for persons of leisure a sort of regularity in the pleasures of the city and country. Certain zodiacs commence at Easter, i.e., in April (the Bull); others, for exam-

example, that of Vezelay begins in January (Aquarius). But fre-
quently these signs in our monuments are not in place. Being sculptured on blocks of stone before setting, on voussoirs or courses, the workman did not always follow the order in which they should be placed, and that order was changed.

End of 9 th Volume.

TABLE OF CONTENTS

RATIONAL DICTIONARY

OF

FRENCH ARCHITECTURE

From XI to XVI Centuries

By

EUGENE EMANUEL VIOLLET-LE-DUC

Government Architect

Inspector General of Diocesan Edifices

Volume X

Index to Buildings cited

PARIS

Translated by N. Clifford Ricker. D. Arch.

Emeritus Professor of Architecture

UNIVERSITY OF ILLINOIS

Urbana. Ill.

1919

NOTICE.

The method that we have believed should be adopted for the Table of Contents of the Dictionary requires explanation. What is important to the possessor of a work of this nature is to be able to consult it without loss of time. Now the dictionary form permits by reading an Article -- easily found by the alphabetical order -- one to know what that Article contains; but if the reader desires to know if in the course of the work, t there is mentioned a certain edifice or a certain portion of it, the search will be very lengthy and often fruitless. The monographs of certain monuments of great importance are found scattered in twinty or thirty Articles, so to speak, and that was one of the objections made to the dictionary form, that we have chosen. Our Table of Contents removes that objection, since by referring to the monument (in this Table), all the passages of the Dictionary that describe or mention the different parts of this monument are given with the date of its erection, its construction and the Figs. accompanying the descriptions. But we cannot pretend to make a Table which can satisfy all sorts of researches; we do not count merely architects and archaeologists among our readers, and our Table cannot be made with the view of only satisfying the searches of archaeologists and architects. It has then seemed to us necessary to place opposite each page a blank page of sized paper, on which each one could write the notes or references, which facilitate researches, of whatever nature these may be.

We have learned at our cost how difficult it is to possess the contents of a work to be consulted; how the Tables are cohfused , if they pretend to explain; how they are frequently insufficient, if they are arranged in a simple and clear manner. Each reader demands from a work in great part critical and historical, references peculiar to the use that he wishes to make of it; it is necessary at need, to add to the brief Table notes, references and sometimes a commentary. We then hope that our readers will see in this innovation a desire to facilitate their researches, to save their time; for we do not flatter o ourselves of ever seeing the Dictionary classed among those books, that are opened for reference, and from which one can never separate himself; like the rare friends to whom one wishes to speak a word in haste, and that hold you for hours py the

charm of their conversation. To him alone is pardoned the time passed in reading or understanding them.

ANALYTICAL TABLE
OF THE
WORDS CONTAINED IN THE NINE VOLUMES

ABBEVILLE. (Somme).

Church S. Wulfrand	Century	Volume	Page	Figure
Flying buttress	XVI	I	79	69
Doorway	XVI	VII	436	
House				
Slates	XVI	I	457	18
Shutter	XV	VI	378	16

ACRE SUR LA LYS. (Pas de Calais).

Church		V	186	

ACY EN MSLTIEN. (Oise).

Church		V	185	

AGDE. (Herault).

Cathedral, old		V	[illegible]	

AGEN. (Lot-et-Garonne).

Cathedral				
Capital	XII	II	495	
Corbel	XIII	IV	490	6,7
Church of Jacobins	XIII	V	181	
Nave	XIII	VII	299	
Painting	XIII	VII	87	9,10,11,12,13
House, Rue S. Antoine				
Grille	XIII	VI	63	9

AGNETS. (Oise).

Church	XIII	V	185	

AIGNAY-LE-DUC. (Cote-d'Or).

Church	XIII	V	174	

AIGUES-MORTES. (Gard).

Ramparts	XIII	I	378	25
City				
Alignment	XIII	I	13	
Tower	XIV	IX	101	
Light tower	XIII	IX	182	

AIGUILLON. (Lot-et-Garonne).

City				
Siege	XIV	I	397	

AILLAS. (Gironde).

Church		V	178	

AILLY-SUR-NOYE. (Somme).

Church			192	

Archivolt of window	XIII	I	54	
Archivolt of portal	XIII	I	53	30
Altar	XIII,XV	II	52,54	20,21
Coping	XIII	II	66	
Band	XIII	II	107	9
Base	XIII	II	14/,149	
Belfry	XVI	II	193	
Anchoring	XIII,XV	II	402,404	7,8
Chapels of apse	XIII	I	201	
Chapels of choir	XIII	II	333	21
Chapels of nave	XIV	I	20/	
Capital	XIII	II	519,531	35,36
Carpentry	XVI	III	21	
Choir	XIII	II	331	21
Christ (W.portal)	XIII	III	243	4,5
Pendant, wooden	XVI	III	280	
Bell	XV	III	285	
Bell tower (central)	XIII	III	312	
Cloister	XIV	II	328	
Choir enclosure, stone	XVI	III	470	
Conduit	XIII	III	506	5
Corbels	XIII	IV	316	
Cornice	XIII	IV	343	24
Crocket	XIII	IV	411	11
Font, baptismal	XII	V	536	
Pavement	XIII	V	18	6
Shells	XIII	V	102	4
Scale	XIII	V	146	
Finial(hall of Maccab).	XIV,XVI	V	2/9	284
Stair	XIII	II	328	
Window	XIV	IV	279	
	XIII	V	389	20
Spire	XVI	II	326	
		V	444,466	25,to 28
		VII	220	
Flower	XIII	V	475	/
Foundations	XIII	IV	176	100
Gable	XIII	VI	4	
Gallery of kings	XIII	VI	8,13	4,5
Gargoyle	XIII	VI	24	5

BOURBON-L'ARCHAMBAULT (Allier)				
Church		V	169	
BOURG-DIEU (Indre)				
Church (abbey), capital	XII	V	486	1
BOURGDUN (Seine-Inferieure)				
Church		V	190	
BOURGES (Cher)				
Cathedral	XIII	II	294	
		V	173	
Apse	XIII	I	6,9	6
Arcade, ornament	XIII	I	105	
Architecture		I	140	
Chapels of apse	XIII	I	201,207	
		II	466	
Choir	XIII	I	235,237	
Enclosure, choir	XIII	III	230,470	
Crypt	XIII	IV	459	
Portal	XIII	I	208	
Proportion	XIII	VII	546	6,7
Cusp	XIII	VIII	8	4
Sculpture	XII	VIII	204	
Bay	XIII	IX	250	7
Leaf of door	XV	VI	370	
Glass	XIII	IX	407,424-14,17,19,20,2	
Vault	XIII	I	198,200	34
		IX	541	
Church S. Bonnet		V	173	
Mansion Jacques Coeur	XV	VI	276	33,34,35
Sill, Window	XV	I	13	3
Chapel	XV	II	442	
Fireplace	XV	III	205	
Bracket	XV	IV	503	18
Finial	XV	V	284	
Doorway	XV	VII	460	87,88
Ironwork	XV	VIII	323	
Statuary, painted	XV	VIII	275	
Tower	XV	IX	170	
Treasury	XV	IX	262	
Leaf of door	XV	VI	370	
Monastery S. Ursin, sculpt-e	XII	VIII	202	42

Wouse, wooden. Slates	XVI	I	457	
CAUNET (Var)				
Church		V	193	
CAUROY (Marne)				
Church		V	183	
CAUSSADE (Tarn-et-Garonne)				
Church	XIV	V	193	
Tower, brick	XIV	II	250	
		III	394	
House	XIII	VI	233	10
CAVAILLON (Vaucluse)				
Cathedral, old	XIII	V	193	
CEFALU (Sicily)				
Cathedral, transept	XII	IX	216	
CEFFONDS (Haute-Marne)				
Church		V	183	
CELFROUIN (Charente)				
Lantern of dead	XII	VI	160	1
CELLE-BRUERE (Cher)				
Church		V	173	
CELLENEUVE (Herault)				
Church S. Croix		V	178	
CELLES (Deux-Sevres)				
Church		V	192	
CERCLES (Dordogne)				
Church		V	175	
CHAALIS (Oise)				
Church (abbey)		V	185	
CHABLIS (Yonne)				
Church	XIII	V	194	
CHADRILLAN (Drome)				
Church		V	176	
CHAGGA,(central Syria)				
Church, vault	IIIII	IX	480	8,9
CHAILLY (Oise)				
Abbey, pendentive	XII	IX	313	3
CHAISE-DIEU (Haute-Loire)				
Abbey, elbow rest	XIV	I	11	
CHALOCHE				
Church,.Abb. Tomb	XIV	IX	65	30

CHAMBOIS (Orne)				
Castle, keep	XII	V	48	11,12,13
Turret tower	XIII	V	115	1
Church	XII,XIII	V	186	
CHAMBON (Creuse)				
Church S. Valery	XII	V	175	
CHAMBON (Puy-de-Dome)				
Church	XII	V	186	
CHAMBORD (Loire-et-Cher)				
Chateau	XVI	III	185	38
Chimney, slates	XVI	I	459	
Ciphers	XVI	III	226	
Cornice	XVI	IV	344	
Flues	XVI	III	217	
CHAMIGNY (Seine-et-Marne)				
Church		V	191	
CHAMPAGNE (Ardeche)				
Church		V	170	
CHAMPAGNE (Seine-et-Oise)				
Church	XIII	V	192	
CHAMPDENIERS (Deux-Sevres)				
Church		V	192	
CHAMPEAUX (Seine-et-Marne)				
Church	XIII	V	191	
Triforium	XIII	IX	306	
CHAMPLIEU (Oise)				
Temple, capital	III	VIII	163	1
CHANTEUGES (Haute-Loire)				
Church		V	180	
CHANTILLY (Oise)				
Chateau	XV,XVI,XVII	III	177	34
Steps	XVI	VII	121	
CHAOURCHE (Aube)				
Church		V	170	
CHAPAISE (Saone-et-Loire)				
Church		V	188	
CHAPELLE-SOUS-CRECY (Seine-et-Marne)				
Church	XIII	V	191	
Bell tower	XIII	III	402	83

Rose window	XIII	VIII	64	
Sacristy	XIV	II	313	
		VIII	68	
Sculpture	XIII	V	517	34
	XII	VIII	208	45
Fonndation	XIII	VIII	453	
Statuary	XII,XIII	VIII	117,168,273	7,9 B
Towers	XIII	II	312	12
Windows	XII,XIII	II	315	
Virtue	XIII	IX	360	3
Glass, Jesse tree	XII	VI	144	
Glass	XII,XIII,XIV	IX	387,458	5,8,15
Vault	XIII	I	198	
Church S. Aignan	XVI	V	176	
Church S. Andre	XIII	V	176	
Church S.Pere (abbey)	XIII	V	176	
Buttress, flying	XIII	I	74	
Archivolt	XIII	I	48	15
Hospital Hotel-Dieu	XII	VI	104	
Keys, sculptured	XII	III	262	
House, dolphin	XVI	V	25	1
Half timber work	XIV	III	53	37
Ceiling	XV	VII	205	5,A
Abbey S. Pere, kitchen	XIII	IV	471	10 to 12
CHARTREUSE (La) Sesere)				
Abbey la Grande	XI	I	307	
CHASTELLUX (Yonne)				
Castle, cremona	XIV	VIII	336	35
CHATEAU-CHINON (Nievre)				
Castle, oubliettes	XIII	VI	452	
Church S. Mesme (abbey)	XII	V	179	
CHATEAUDUN (Eure-et-Loire)				
Chateau, stairs	XVI	V	311	17,18,20
Church S. Madeleine				
Arcade, ground story	XII	I	90	3
Capital	XII	II	501	20
Carpentry, visible	XV	III	34	
Boss of vault	XII	III	264	10
House, wooden	XIV	VI	251	20
		VII	42	4,5
Knocker	XV	VI	83	4

DINAN (Cotes-du-Nord)				
Church S. Sauveur, font	XII	V	542	
Canopy	XII	V	1	
DOL (Ille-et-Vilaine)				
Church, apse	XIII	I	4	
		II	360	
Capital	XIII	II	540	
House, ring	XIII	II	63	5 bis
Shop	XIII,XIV	II	237	2
Piers	XIII	VII	175	19
DOMFRONT (Orne)				
Church N. D. sous l'eau		V	186	
City, balcony	XIV	II	245	
DONNEMARIE (Seine-et-Marne)				
Church	XIII	V	191	
DONZY (Nievre)				
Church		V	185	
DORAT (Puy-de-Dome)				
Church	XII	V	186	
DORAT, La (Haute-Vienne)				
Church (abbey)	XII	V	194	
DORMANS (Marne)				
Church, tower	XIII	III	332	39,40
DOUVRES (Calvados)				
Church		V	172	
DOVER (England)				
Mill	XI	VI	406	
Siege	XIII	VIII	403	
DRESDEN (Saxony)				
Museum, altar	XV	II	54	
Tiles, floor	XIII	II	263	5,5 bis
DREUX (Eure-et-Loire)				
Church S. Pierre	XIII,XV	V	176	
House	XII	VII	38	1,2,3
DUCLAIR (Seine-inferieure)				
Church		V	190	
DUGNY (Meuse)				
City, def. gallery	XIV	VI	137	10
DUNQUERQUE (Nord)				
Church S. Eloi		V	185	

JOSSELYN (Morbihan)				
Castle				
Balustrade	XVI	II	95	27
Dormer window	XVI	VI	191	4
JUMIEGES (Seine-inferieure)				
Abbey				
Tower	XII	I	208	
Church (abbey)				
Capital	XI	II	507	
Bell tower	XII	III	334	
JUSSY (Moselle)				
Church		V	184	
K				
KINGSTON-ON-HALL (England)				
Castle	XV	I	427	66 bis
KONIGSHEIM (Bas-Rhin)				
Castle	XIV	III	105	
L				
LAACH (Germany)				
Abbey				
Apse	XII	I	209	
LACHALADE (Meuse)				
Church (abbey)		V	184	
LACHATRE (Indre)				
House				
Door	XIII	VIII	458	85
LA FERTE-ALEPS (Seine-et-Oise)				
Church	XII	V	191	
LA FERTE-BERNARD (Sarthe)				
Church				
Balustrade	XVI	II	95	
Tracery	XVI	VI	341	11
Vault	XVI	IV	122	73
LA FERTE-MILON (Aisne)				
Castle				
Statuary	XV	VIII	271	
		IX	363	
Church		V	168	

LA SOUTERRAINE (Creuse)				
Church, doorway	XII	VII	408	61
LASSAY (Loire-et-Chere)				
Church		V	180	
LAVAL (Mayenne)				
Castle, galleryldef.	XII	VI	125	3
Church S. Martin		V	184	
Church of Trinity	XII	V	184	
Vault	XII	IX	515	28
House	XIV	VI	251	21
LAVARDIN (Loire-et-Cher)				
Church		V	180	
LA VOULTE-CHILHAC (Haute-Loire)				
Church				
Leaf of door	XI	VI	361	10
LAYRAC (Lot-et-Garonne)				
Church		V	181	
LECTOURE (Gers)				
Gate, fortified	XVI	I	425	66
LEHON (Cotes-ds-Nord)				
Church		V	175	
LEMBEYE (Basses-Pyrenees)				
Church		V	187	
LEOGNAN (Gironde)				
Church, cornice	XI	IV	320	1
LESCAR (Basses-Pyrenees)				
Church		V	187	
LESPARRE (Gironde)				
Castle				
Tower	XIV	IX	147	
LESSAY (Manche)				
Church		V	182	
LESTERPS (Charente)				
Church	XII	V	173	
Bell tower	XII	III	336	
Porch	XII	VII	287	
LESTRE (Manche)				
Church S. Michel		V	182	
LEVROUX (Inore)				
Church	XII,XIII	V	178	

Base	X,XIII	II	130,149	10
Chapels	XIII	II	357	
Capital	XIII	II	541	
Choir	XIII	I	200,236	59
		II	355	
Bell tower	XIV	II	356	
Buttress	XIII	IV	297	16
Window	XIII	I	464	5
Rubble	XI	VI	401	
Nave	XII	II	354	
Niche	XIII	VI	415	2
Plan	XI,XIII	II	354	34,35
Rosette	XIII	VIII	38	
Sacristy	XIII	II	356	
Transept	XIII	IX	239	
Glass	XII	IX	382	3
Vault	XII	I	172	
Church Notre Dame de la Coulture (abb).				
Crocket	XIII	IV	404	4,5
Abutment	XII	VIII	441	3
Bay	XII	IX	255	9
Church Notre Dame du Pre				
Carpentry		I	178	
Cornice	XI	IV	327	6
Bay	XI	IX	241	2
MANTES (Seine-et-Oise)				
Church Notre Dame				
Apse	XII	I	6	
Apocalypse	XIII	I	24	
Chapel	XIV	II	452	24,25
Capital	XII	II	511	28
Bell tower	XIII	I	209	
Last judgment	XIII	VI	151	
Rose window	XII	VIII	40	3
Triforium	XII	IX	283	7 ter
Trinity	XII	IX	308	
Vault	XII	I	191,196	32
MARCEVAL (Pyrenees-orientales)				
Church		V	187	

Pinnacle	XIII	VII	182	7 D
Piscina	XIII,XIV	VII	195	
Portal	XIII	I	208	
Portal of Virgin	XIII	VII	419,421	67,68
Portal, south	XIII	VII	454	
Doorway, red	XIII	VII	454	
Profile	XII	VII	506	16
Proportion	XII,XIII	VII	543	
Rose window	XII,XIII	VIII	39,67	1,4,5,7,8,15 C,D
Sacristy	XII	VIII	69	1
Sculpture	XIII	V	499	15,17,21,36,38
	XII,XIII	VIII	222,239	54,55
Ironwork	XII	VIII	290,300	10 to 13
Foundation	XIII	VIII	455	
Stall	XIV	VIII	471	
Statuary	XIII	VIII	136,139,156,164	15,16,20,23,2
	XII	VIII	257	
Tomb		IX	31	
Trace	XII	IX	206	3 A
Transepts	XII	IX	222	
Treasury	XII	IX	261	
Tribune	XIII	IX	266	
Triforium	XII	IX	280	
Mullion	XIII	IX	317	
Tympanum	XIII	IX	333	
Leaf of door	XIII	VI	365	
Virtue	XIII	IX	357	
Virgin	XII	IX	365,368	1,4
	XIII,XIV	IX	371	
Glass	XII,XIII	IX	399,418	22 bis A
Vault	XII	I	188,192,195	27 to 29
		VI	432	6,8
		IX	512	26,27
Zodiac	XIII	IX	553	
Chamber of Accounts				
Window sills	XVI	I	13	4
Ciphers	XVI	III	226	
Stairs	XVI	V	289	3
Loggia	XVI	VI	185	5
Ceiling	XV	VI	385	

Gibbet of Montfaucon	XIV	V	554	1 to 3
Gibbet of Montigny	XIV	V	562	
Market halls		I	318	
	XII	VI	80	
Hospital S. Catherine		I	316	
Mansion Artois, chamber	XV	II	419	
Mansion Bourbon, chapel	XV	II	441	
Mansion Cluny	XV	VI	284	38,39
Fireplace	XVI	III	208	
Dormer	XVI	VI	191	
Doorway	XVI	VII	462	
Mansion Guise, tiles	XIV	II	272	14,15
Mansion S. Pol, baths	XIV	V	349	
Chapel	XIV,XV	II	441	
Mansion Sens	XV	VI	287	
Doorway	XV	VII	462	
Mansion la Tremoille	XVI	VI	282	36,37
Animals	XVI	I	24	
Arch	XVI	IV	283	2
Base	XIV	II	163	46
Balustrade	XVI	II	95	28
Buttress	XVI	IV	304	
Window	XVI	VI	380	21,22
Bracket	XVI	IV	502	17
Sewer	XIII	V	196	1,2
Stairs	XVI	V	312	19
Window	XVI	V	416	42
Horseblock	XVI	VI	402	1
Portico	XVI	VII	470	
Beam, trussed	XVI	III	57	40
Turret	XVI	IX	194	
City Hall,	XVI	VI	95	
Foreplace	XVI	III	208	
Hospital Hotel-Dieu				
Hood	XV	II	57	
House, Rue S. Denis				
Post, corner	XVI	VII	475	
Palace of the Cite	XIII,XIV	VII	5	2
Arch	XIII	I	56	

Anchors	XIII	II	401	6
		IV	182	
Capital	XIII	II	531,535	49
Gutter	XIII	III	223	4,5
Cipher	XV	III	226	
Key of vault	XIII	III	267	15
Column, little	XIII	III	500	
Construction	XIII	IV	193	
Cresting	XV	IV	399	
Crocket	XIII	IV	410	10
Bracket	XIII	IV	497	12
Canopy	XIII	V	4	
Stairs	XVI	II	430	
	XIII	V	320	
Window	XIII	II	427,432	
		V	385	19
Spire	XV	II	429	
		V	466	
Gable	XIII	VI	4	
Gargoyle	XIII	VI	23	4
Tracery	XIII	VI	336	
Oratory	XV	II	436	
		VI	449	
Painting	XIII	VIII	77,93	
Pinnacle	XIII	VII	182	7 A
Piscina	XIII	VII	193	
Porch	XIII	VII	287	
Doorway	XIII	VII	427	
Proportion	XIII	VII	543	4,5
Cusp	XIII	VIII	5	
Rose window	XV	VII	123	
		VIII	62	12
		IX	441,442	
Sacristy	XIII	VIII	71	
Sculpture	XIII	VIII	245	64
Statuary	XIII	VIII	168	
Treasury	XIII	IX	261	
Treasury of charters	XIII	II	428	
Leaf of door	XIII	VI	362	12

Capital	XIII	II	516,518	33,34
Carpentry	XV,XVI	III	18	14
Bell tower	XIII	III	388	74
Screen		III	465	
Buttress	XIII	IV	300	
Corbel	XIII	IV	316	
Cornice	XIII	IV	333	15
Crown of the Virgin	XIII	IV	367	
Crocket	XIII	IV	413	
Canopy	XIII	V	4	7
Scale	XIII	V	147	
Stairs	XIII	V	317	23
Window	XIII	II	321	
		V	383	17,18
Spire	XIV	V	439	
Flower	XIII	V	479	
Gable	XIII	VI	4	4
Gallery	XIII	VI	9,11	
Labyrinth	XIII	VI	152	
Corona	XIII	II	317	16,17,17 bis
		VII	501	
Dormer	XV	VI	192	
Tracery	XIII	VI	318	2
Nave	XIII	I	207	
Yard	XIV	VII	52	1
Painting	XII	VII	57	
Pier	XIII	VII	165	14
Pinnacle	XIII	VII	179	4
Piscina	XIII	VII	195	
Leadwork	XV	V	472	
Portal	XIII	I	208	
Doorway	XIII	II	322	
		VII	425,444,454	57
Rose window	XIII	VIII	58	
Sculpture	XIII	II	320	
Impost	XIII	VIII	447	7
Statuary	XIII	VIII	149,257	17,18
Tie	XIII	IX	20	
Linen, painted	XV	IX	21	

Chapels	XIII,XIV	II	364,456	39
Gutter	XII	III	219	1
Choir	XIII	I	237	60
Bell	XVI	III	285	
Bell tower	XIII	III	312,369	62
Cloister	XIII	II	365	
		III	449	34,35
Buttress	XVI	IV	303	
Cornice	XIII	IV	338	20
Crown of the Virgin	XIV	IV	367	
Creation	XIV	IV	371	
Bracket	XIII	IV	496	11
Finial	XVI	V	284	
Gable	XIV	VI	6	5
Gallery	XIII	VI	16	9
Grillage	XIV	VI	54	2
Jesse, tree of	XVI	VI	144	
Last judgment	XIV	VI	151	
Nave	XIII	I	198	
		II	364	39
Niche	XIII	VI	414	1
Pinnacle	XIII,XIV	VII	182	6
Portal	XII,XIV,XVI	II	365	
Doorway	XIV	VII	432	70
Sacristy	XII	VIII	69	
Sanctuary		III	235	
Tomb	XII	IX	37	
Tower, Butter	XVI	II	365	
Tower, central	XIII,XVI	I	208	
Tower S. Romain	XII	I	91	
	XII,XIII	II	106,362	6,39
Cresting	XV	IV	398	8
Plan		III	369	62
Leaf of door	XV	VI	370	
Vault	XIII	I	198	
Castle, keep	XIII	V	72	32-34
Church of Mt. au malades		V	190	
Church S. Gervais		V	190	
Church S. Godard		V	190	

S. BENOIT-SUR-LOIRE (Loiret)				
Church (abbey)	XI	III	287,335	41,42
Bell tower	XI	III	287,335	41,42
Crypt	X	I	9	
	XI	VI	460	
Pavement	XII	V	10	
Porch	XI	VII	287	
S. BERTIN (Pas-de-Calais)				
Abbey, mill	VIII,XI	VI	405	
S. BERTRAND DE COMMINGES (Haute-Garonne)				
Abbey, animals	XII	I	22	2
Arm rest	XVI	I	11	
S. BRIEUC (Cotes-du-Nord)				
Cathedral	XIV,XV	V	175	
S. BRISSON (Loiret)				
Church		V	181	
S. CALAIS (Sarthe)				
Church		V	189	
S. CESAIRE (Bouches-du-Rhone)				
Church		V	171	
S. CHEF (Isere)				
Church, angels	XII	I	17	
S. CHRISTOPHE LE JAJOLET (Orne)				
Castle, finial	XVI	V	276	
S. CIERS LA LANDE (Gironde)				
Church, cross	XIII	IV	426	10
S. CLAUDE (Jura)				
Cathedral, present				
Watch turret	XIV	V	141	24,25
Stall	XV	VIII	465	5,6
S. CONTEST (Calvados)				
Church		V	172	
S. CYPRIEN (Dordogne)				
Church		V	175	
S. CYR (Seine-et-Marne)				
Church		V	191	
S. CYR LA ROCHE (Correze)				
Church		V	174	

S. DENIS (Seine)

Rood loft	XII	VI	149	
Marquetry	XVI	VI	386	
Mosaic	XII	VI	404	
Nave	XIII	IX	257	
Yard		VII	52	
Paintings	XII,XIII	VII	103	20
Pinnacle	XIII	VII	182	
Piscina	XII	VII	189	
Porch	XII	VII	278	
Doorway	XII,XIII	VII	427,393	
Profiles	XII	VII	504	15,19
Reredos	XIII	VIII	37	
Rose window	XIII	VIII	68	
Sanctuary	XII	VIII	95	
Sarcophagus		IX	24	1 A
Sculpture	XII	VIII	212	48,51
Statuary	XIII,XIV	VIII	168,252	
Tombs	XVI	I	216	
	XIII	V	469	
	XII	IX	25,32,60	1 A, 7,8
	XIII	IX	47,56,60	18
(metal)	XIII	IX	62	27,27 bis
	XVI	IX	56	
Detail	XII,XIII	IX	201,209	1,4
Transepts	VII	IX	215	
		IX	227	9
Triforium	XIII	I	205	36
		IX	292	13,14
Leaf of door	XII	IX	350	
Glass	XII	IX	447	
Vault	XII	VI	446	
		IX	501	22
Zodiac	XII	IX	553	

S. DENIS DE PILES (Gironde)

Church		V	178	

S. DIDIER LA SEAUVE (Haute-Loire)

Church		V	181	

S. DIE (Vosges)

Cathedral, pulpit	XVI	II	412	4
Doorway	XI	I	211,214	40,42

Heuse, window sill	XII	I	42	6
S. GONSTAN (Loire-inferieure)				
Church		V	181	
S. GUILHEM LE DESERT (Herault).				
Church (abbey)	XII	V	178	
S. HILAIRE LA CROIX (Puy-de-Dome)				
Church		V	186	
S. HONORAT (Ile de Lerins)				
Church, gable	XII	VII	131	1
S. JACQUES (Seine-inferieure)				
Dovecot, brick	XVI	III	437	
S. JEAN-AUX-BOIS (Oise)				
Abbey, doorway	XV	VII	386	50
Church (abbey)	XIII	V	185	
Stoup	XIII	II	201	1 bis
Cornice	XIII	IX	329	9
Trabes	XIII	IX	197	1
Transepts	XIII	IX	230	10
Glass	XIII	IX	448	39
S. JEAN DE COLE (Dordogne)				
Church	XII	V	175	
S. JEAN DES CHOUX (Bas-Rhin)				
Church		V	137	
S. JEAN DU DOIGT (Finisterre)				
Church		V	176	
S. JEAN LES BONHOMMES (Yonne)				
Obedience	XII	I	277	11,12
Buttress	XII	IV	295	13
Piscina	XIII	VII	190	3
S. JULIEN DE ROYAUCOURT (Aisne)				
Church		V	168	
S. JULIEN DU SAULT (Yonne)				
Church	XIII	V	195	
S. JUNIEN (Haute-Vienne)				
Church		V	194	
S. JUST DE VALCABRERE (Haute-Garonne)				
Church	X,XII	V	177	
Altar	XIII	II	38	12 B-12 D.

S. LAURENT (Calvados)				
Church, buttress	XII	IV	287	5
S. LEONARD (Haute-Vienne)				
Church, tower	XII	III	294	6
S. LEU D'ESSERENT (Oise)				
Abbey, doorway	XIV	VII	384	48,49
Church (abbey)				
Apse	XII	IV	83	45,45 bis
Chapel	XII	II	461	
Capital	XII	II	504,525	21
Bell tower	XII	III	373	
Buttress	XII	IV	290,293	10
Porch	XII	VII	278	
Sculpture	XIII	V	478	
Triforium	XIII	IX	281	6,7
S. LIZIER (Ariege)				
Abbey, cloister	XII	III	436	23,24
Church	XII	V	170	
S. LO (Manche)				
Abbey, flue	XIII	III	210	15
Church Notre Dame		V	182	
Church S. Croix, pulpit	XV	II	412	
S. LOUP DE NAUD (Seine-et-Marne)				
Church	XI,XII	V	191	
S. LUC (Eure)				
Church		V	176	
S. MACAIRE (Gironde)				
Church, apse	XI ,XIII	I	5	
Transepts	XII	I	216	
S. MAIXENT (Deux-Sevres)				
Church		V	192	
S. MARCEL (Saone-et-Loire)				
Church		V	188	
S. MARCEL DE SAUZET (Drome)				
Church		V	176	
S. MARIE-AUX-ANGLAIS (Calvados)				
Church	XII	V	172	
S. MARIE DU MONT (Manche)				
Church		V	182	

Piscina	XIII	VII	195	6
Portal	XIII	I	208	
Rosette	XIII	VIII	38	1
Rose window	XIII	VIII	68	
Substructure	XII	VIII	456	
Tower	XIII	II	358	
Bay	XIII	IX	258	11 A
Triforium	XIII	IX	296	15
Leaf of door	XIII	IX	350	4
SEGONZAC (Charente)				
Church, tower	XII	III	318	
SELLES S. DENIS (Loire-et-Cher)				
Church S. Genoux		V	180	
Church S. Thaurin		V	180	
SELLES-SUR-CHER (Loire-et-Cher)				
Church		V	180	
SEMUR EN AUXOIS (Cote-d'Or)				
Castle, chimeney flue	XIV	III	211	17
Church Notre Dame				
Abacus	XIII	I	2	4
Apse	XIII	I	9	
Angel	XIII	I	20	
Apostle	XIII	I	26	
Window sill	XIII	I	42	5
Arcade ornament	XIII	I	105	
Buttress, flying	XIII	I	68,74	58
Architect	XIII	I	115	1
Archivolt	XVI	I	53	32
Band	XIII	II	109	10
Base	XIII	II	147	29,31
Capital	XIII	II	513	29,30
Hinge	XV	VIII	347	43
Key of vault	XIII	III	266	14
Cloister	XIII	III	439	25,26
Canopy	XIV	V	5	
Scale	XIII	V	146	
Cresting	XV	V	364	8
Wainscot	XV	VI	358	8
Chimney cap	XIV	VI	398	2
Piscina	XV	VII	196	7

Corbel	XII	IV	318	
Crowning of Virgin	XIV	IV	367	
Cresting	XV	V	363	7
Window	XIII	V	411	38,39
Claw	XIV	VI	52	11
Rood loft	XIII	VI	148	
Judgment, last	XVI	VI	151	
Plan	XII	II	348	30
Portal	XII	I	208	
Doorway	XII	VII	393	
Sculpture	XII	VIII	216	49,50, 52.
Statuary	XIII	VIII	136	
Suspension	XIII	II	49	
Transept	XII	IX	222	6
Triforium	XII	I	201	
		IX	286	9
Mullion	XII	IX	317	2
Virtue	XII	IX	357	1,2
Virgin	XII	IX	372	
Glass	XIII, XVI	II	351	
Vault	XII	IV	49	
		IX	506	23-25.
Church S. Colombe, floor	VII	II	265	6
Church S. Jean, gallery	XIII	VI	16	8
Church Ss. Savinien etc.	XII	V	195	
Church S. Potentien	XII	V	195	
Ditches		V	549	
Hospital, chimney cap	XIII	VI	398	1
House, tree of Jesse	XVI	VI	145	
Gate Notre Dame, wicket	XIV	V	118	3
Hall of Synod	XIII	VIII	74	1,2
Arch	XIII	I	56	
Construction	XIII	VII	123	
Buttress	XIII	IV	301	
Bracket	XIII	IV	306	
Frieze	XIII	V	304	19
Tracery	XII	VI	343	12
Pinnacle	XIII	VII	182	7 8
Pri[illegible]	XIII	VII	478	1,2

TOULOUSE (Haute-Garonne)

Archivolt	XI	I	47	11
Cupboard	XIII	I	467	1
Astragal	XIII	II	12	6
Ring	XIII	II	61	4
Coping	XII	II	66	
Balustrade	XII,XIII	II	67,68	1,2
Band	XI	II	104	2
Base	XI,XII	II	128,141	5,6,24
Round	XII	II	218	3
Anchoring	XI	II	307	1,2
Chapels, apsidal	XII	II	457,465	
Capital	XI,XII	II	487,524	8-10,38
	XII	V	485	7,7 bis, 8
Choir	XII	I	232	54,55
Christ	XII	III	238	1
Key of vault	XII	III	257,262	2,7
Bell tower	XII	I	168,207	
Nail	XI	III	471	1
Column	XII	II	277	
		VII	123	
Conduit	XII	III	502	1
Stop	XII	III	512	4
Cornice	XI,XII	IV	323,330	3
Crocket	XII,XIII	IV	400,402,409	3,9
Crypt	XII	IV	461	
Devil	XI	V	30	2
Cresting	XII	V	360	
Window	XII	V	370	6
Ornament	XIII	V	473	4
Claw	XII	VI	49	5
Narthex	XII	I	207,259	
Gable	XIII	VII	139	9,10
Pier	XII	VII	158	6
Piscina	XII	VIII	189	1
Porch	XII	IV	31	19
		VIII	263	3,4
Doorway	XII	VII	387,436	51,71
Profile	XII	VIII	495,505	9 C,D,17
Sculpture	XII,XIII	V	508	25,32
	XII	VIII	180,208,234	31,32,46 47,57 63,71

RATIONAL DICTIONARY

OF

FRENCH ARCHITECTURE

From XI to XVI centuries

By

EUGENE EMANUEL VIOLLET-LE-DUC

Government Architect

Inspector General of Diocesan Edifices

Volume XI. Topical Index rearranged.

By Henri Sabine

PARIS

Translated by N. Clifford Ricker. D. Arch.

Emeritus Professor of Architecture

UNIVERSITY OF ILLINOIS

Urbana. Ill.

1919

PREFACE.

A preface to the table of contents of a book is sufficiently rare to require ixplanation; this is because that in contrast to other works, this book not only fulfils the promise of its title, but even ten times more.

This title of Dictionnaire raisonee de l'Architecture francaise du XIe Au XVIe Siecle (Analytical dictionary of French Architecture from the 11 th to the 16 th centuries), is true for a part of the work; it is silent on other parts, and perhaps has caused a belief in the pretended exclusivism of the author of the work.

Now that is an error.

One may think that in commencing such a work, Viollet-le-Duc, inspired by hi convictions as artist, archaeologist and architect, only had in view the placing within the reach of the greatest number the results of hi studies on French architecture. But from that sole point of view, induced by the subject, he was at first led to the study of the arts connected with the art of architecture, and his vast knowledge did not allow him to stop in that order of ideas, until after having treated the subject in all its branches and ramifications.

Thus for the epoch adopted by the author, the book must comprise the study of architecture, construction, decoration (painting, sculpture, statuary and ornament) and of the secondary arts associated with the architectural work.

Such a work might well hav been the book promised by the t title; but if he had fulfilled the programme announced, he certainly would not have satisfied the desires of the readers and the conscience of the author. Indeed, how conceive the study of an art period without the preliminaries, that connect it with the study of the arts preceding it. The arts, and architecture more than any other, are not the products of spontaneous generation. They are the results of earlier labors of mankind; the proceed, succeed each other, and historically explain each other.

Then unless one confines himself to a definite period of history, this period must be connected with the preceding, and if the author be like Viollet-le-Duc, able to rest re the entire series by his studies and marvellous intuition, he will ascend link by link and from art to art to the beginning of history,

i.e., to the known origins of the arts.

This is what Viollet-le-Duc has done, and thus his limits a and his work have been extended by a primary and happy departure from its title.

Hence the history of the arts in general in their relations to architecture and the history itself of architecture are found in this work from their beginnings in Asia, the cradle of civilization and of mankind, and this history unrolls and connects the Asians with the Egyptiars, Greeks, Romans and Byzantines, to which is joined the origin of the arts of the West.

And this history under the pen of the lucid writer, artist and practician, analytic and eclectic, unrolls while offering the reader the explanation and reason of things, the justification of the preferences that he sanctions, and that is why one also finds in the work criticism and comparison, i.e., comparative art and comparative architecture.

What are the results of these anylitical comparisons? According to the theory of the author, if art be the ideal expression of the beautiful founded on inspiration, reason and taste, two arts alone merit this supreme title; these are Grecian art and Gothic art. Those two arts alone have produced and left behind them types, which realize the absolute beautiful or approach it; they alone have obtained these exceptional effects by applying to their conceptions superior theories and procedures.

The primitive arts are incomplete; Roman art is only a very unsuccessful imitation of Grecian; modern arts (save happy and partial exceptions) are in decadence. And this is so because the primitive arts were the infancy of art, because the Romans only took the appearance of Greek art, and that in the matter of art the moderns have neither rules, methods nor principles.

Such is the theory of the general evolution of the arts and of architecture according to Viollet-le-Duc; he verifies it by history, comparison, analytical criticism and examples, and already we see him produce a work, not of exclusivism, but indeed as an enlightened and impartial historian. If he gives the preeminence to Greek art in antiquity, to French art in modern t times, this is by basing himself on numerous and incontestable proofs, and his analytical convictions are impressed on the r reader.

Here then are the singularly extended limits, for we find

there in addition to French architecture and the arts joined to it, the origin of the arts themselves, their development, crossings and ramifications in antiquity, then their consequences in modern times and until our days. But our author does not stop there. Led by his vast knowledge and his generalizing mind, he comprises in the same glance the history of humanity and that of the arts, an expression of the development of the civilization and of the intelligence of the peoples; he explains the origin and production of the arts by the crossing of races, their characteristics by the character and spirit of the peoples: in studying French arts, he causes to progress the history of the nation and provincial history with the general history of art and of civilization, and this complex study is unrolled with an impressive logic, anforms for the French middle ages an animated picture reproducing the social, artistic and political fermentation of the epoch.

After the fall of the Roman empire and the invasions of the barbarians, the Gaulish spirit and genius awakes, the scattered remains of Gallo-Roman monuments serve as models, and the new art slowly separates from the heaped or scattered ruins dispersed over the soil of Gaul. The monks were then the sole depositaries of instruction and tradition, and directed that first r renaissance, to which Charlemagne lent the support and impulse of an organizing and predominant power.

The monastic orders increased in influence. Concessions and donations gave them the means of erecting the first abbeys, a around which were grouped the dwellings of their servants and of their vassals, for the abbots added to the religious authority the feudal lordship and even the judicial and military power. They are lords, holders of fiefs, not always subject to feudal duties, but by their religious character and their science, they have an uncontested superiority to their equals in all other ways, the lay lords.

The abbots train clerics and pupils, and the people grouped around the abbeys, they found agricultural establishments, villages, and even cities. The needs becoming greater, under the initiative and direction of the abbeys, they produce the monastic schools.

Those schools at first produced the monastic art, then Romanesque art, the last expression of the imitation of the vestiges

of Roman art.

Civilzation and instruction extended, commerce increased and expanded, and by way of exchanges were established connections with the Byzantine empire, and then Byzantine art, the heir of Greek and Roman traditions, influenced by contact with Asian arts, penetrated into France and furnished its part in the renewal of Romanesque art, which was entirely imitative and without a flight, reached the limit of its evolution.

Social life increased and was developed. The cities, centres of population, particularly those that had retained the memory of the municipal organization of the Romans, tended to reorganize their internal government. Situated outside the influence of the abbeys, exposed to conflicts with secular feudalism, t they sometimes invoked the protection of the royal power, which was long contested but gained strength in the midst of struggles and conflicts, waiting until it should become the predominant and uncontested soverignty.

Thus certain cities had obtained charters of communes, recognizing their particular rights, compensated by duties and charges, but also ensuring them at need a recourse of the royal protection.

In these communes and in many cities were organized trade guilds, at first under religious influence and under the name of confraternities, then under the name of companies of workmen, from which came the organized lay corporations, the guilds.

From them also came the citizens that were to produce the th third class, that being nothing, must absorb everything much later.

But in the important cities existed a power, both religious and feudal, equal to that of the abbots and aspiring to balance their influence. The increasing importance of the cities offered them the opportunity, and the creation of communes gave them the means. The bishops took the direction of this movement, organized and thus maintained themselves with increased power and influence in the elevated position already acquired by their religious and feudal authority.

To their influence is due the prodigious artistic movement from which sprang our cathedrals, monuments both civil and religious, communal and feudal, seats of justice and of public assemblies, of exchange and commerce, the centre of the commu-

communal and religious life and affairs of the city.

This second renaissance had as a specific character the renewal of the arts, the creation of a new art, the separation of the lay arts produced by the guilds, that henceforth alone had the direction and preservation of the arts and trades.

Monastic arts had passed passed its time. Lay art appeared, still impressed by its religious origin, from which it separated later, and that already were merely fetters.

This second renaissance has taken the name of pointed art, a and pointed art is the French art.

Much have been discussed the origins of the pointed form, k known from the most ancient times; but the pointed form of opening made by the meeting of two curves is not the pointed arch. Those broken arches formed by corbelled courses, and not by jointed voussoirs, are not pointed arches. Now the starting point characterizing the pointed arch, is the pointed arch traced according to the principles of geometrical drawing, and from that application of architecture result by analytical and logical , or one may say by scientific transformations, the successive and unbroken evolutions of pointed art, from its f first experiments in the 12 th century to the brilliant and complex commencement of the third renaissance.

To the monastic schools, first to the school of Cluny, and to the relations with the Orient created by the crusades, must be attributed the first applications of the pointed arch and its importation into France. But the utilization of the pointed arch was only the point of departure of the new architecture. If the monastic constructors first employed it to transform the system of vaulting imitated from the Romans, the pointed style separated from the Romanesque only after the invention of the pointed vault, composed of independent ribs and of surfaces f forming compartments.

The pointed vault is the generator of the pointed plan. It gives the dimensions of the voids, the volume of the solids, and the springings of its arches determine the plan of the imposts and of the capitals.

The points of support on the ground are reduced to strict necessity; the voids consume the solids; light replaces shadow. Walls are suppressed and replaced by tracery or enclosures.

For the principle of stability resulting from the strong

footings of the walls is substituted the new principle of equilibrium resulting from analytical study, a wise combination of thrusts and of buttresses.

Antique construction is stable by its weight; pointed construction is stable by elasticity.

See how poin ed architecture constitutes a complete art founded on new and perfected principles, and why alone with Greek architecture, it merits bearing the name of an architectural style, a name too frequently badly employed, the style that m must not be counfounded with the kind.

We state that the pointed vault is the generator of the plan; drawing is the geometrical means of placing that generator in motion, and the vault on ribs being only a structure resulting from exact and rigorous drawings, one asks how were prepared the elevations of this plan, alter having established the plan by drawing the vaults. Geometry again gives the means of scientifically establishing the architectural proportions in height.

Viollet-le-Duc sought the theory of proportions in the monuments of the pointed period; he found it in the use of triangles; and he presents examples measured and drawn from monuments still existing.

The triangle, the geometrical figure representing the greatest stability, the triangle, a natural form of geologic crystallizations, the triangle, particularly a symbolical number and form, employed in the theory of the antique arts, is resumed by the pointed school as a principle of proportion and a means of architectural drawing.

The Egyptians, Greeks and Romans employed the equilateral triangle as a principle of proportions. The lay pointed school, either by tradition found among the Byzantines, or by an instinctive renewal, resumed the use of the triangle, but extending it by the combination of several triangles of different proportions on the drawing of a single elevation, and in that the lay constructors showed themselves ingenious in the application of the principle, having to erect monuments inspired by the new spirit, impelled by other needs, and consequently presenting proportions very different from those of the antique monuments.

We have seen the extension of the primitive limits of the D Dictionnaire raisonnee, in what precedes the 11 th century, the starting point indicated by the title. It is the same with

after the 16 th century, the limit fixed by the same title; and the author from comparison to comparison insensibly brings us to the contemporary epoch, both for the arts in general as for architecture in particular. Passing onward, rapid excursions l lead to foreign countries, and his comparisons of French art with Italian, German and English arts, etc., his conclusions are justified by examples and demonstrate the superior initiative of French genius, in what is pointed art, whose origin has been so much discussed, and even the other styles of the epoch, for which we have gaven inspirations and models to modern Europ.

Architecture is the strongest and most durable expression of intellectual progress and of civilization. It develops and perfects itself even according to the advance of manners and the evolution of society. For this reason it is difficult to write its history without touching on general political, military a and social history.

The erudition of Viollet-le-Duc, his generalizing mind gave him the means of carrying in parallel the history of art and that of the nation, and his Dictionnaire does not fail in this. The conflicts between the clergy, nobility, kingdom and people, are briefly explained, and make understood the development of architecture. Cities fortify themselves and obtain charters of communes; bishops erect their cathedrals, build their palaces, the mark and seat of their feudal power; the nobility erect m manor houses and strong castles; even churches and abbeys are fortified; bridges, passes and ports are likewise equipped with defensive structures; it is the state of organized war, the social state of the middle ages, a consequence of feudal rivalry, or wars and invasion. Viollet-le-Duc passes on, explains the history of feudalism, and at the same time makes a study and description of military architecture.

This study, like that of religious and civil architecture d dates back to the earliest times of history, and continues till our days, and not only do the drawings illustrate and explain the text, but here, more than in the other branches of architecture, the author becomes an ingenious and instructive popularizer. He restores the curtains, machicolations, towers, draw-bridges, etc.; he explains the theory of the attack and defense of places, and placing history in action, his magical and truthful pencil reconstitutes military actions, machines, engines and

arms, and causes thus to appear to our eyes scenes, that the pen alone would have been lowerless tc reproduce.

Sculpture, painting, the secondary arts (called decorative) are studied, analyzed and restored with the same conscientiousness and breadth; one may say with the same enlightened and s scrupulous fidelity.

Viollet-le-Duc, recovering the procedures, the forgotten or lost traditions, follows them in history and practice, to which he adds the technology and the theory. Thus work in iron, forged or cast, and the other decorative metals, painting on glass, mosaic, etc., are described and explained.

In comparative sculpture he causes to appear, as he has done for architecture, the superiority of Greek art in antiquity a and of (pointed) French art in modern times.

In architectural painting or polychromy, he establishes that in all times and all epochs, all peoples have decorated their edifices with colors and designs, then with paintings combined and arranged with a more or less wise harmony of contrast and of decorative effects. There again the analytical theory supports the demonstrations of the eye, and shows that in the matter of art (architecture, sculpture or painting), the procedures, formulas and technics do not suffice, if the artist is not originally gifted, and does not add inspiration and taste.

Lay and religious symbolism, painted or sculptured ornamentation, are treated with the same demonstrative science. The general decoration connected with architecture in pointed art, is explained by history, by the character and the circumstances of the erection of the monuments tha surround it. The peculiarities, oddities and complexity of pointed ornamentation are justified by the tolerance of custom, by the Gaulish spirit of the lay guilds, by the communal purpose of the cathedrals, and finally by the breadth of the religious conceptions of the middle ages, the mythological and pantheistic traditions, that left d deep impressions in the new religion, as well as well as in the memory of the peoples.

Hence to explain the mythological, pantheistic and hieratic character of the arts of the West, proceedsthe utility of the precise ideas of the Asian origin of the religions and the arts, of their succession and superposition in past cen uries, on the persistence of traditions and the resemblances of myths, fictions,

legends and religions.

Plant ornamentation must be inspired by nature, the source and treasury of universal beauty. The Greeks borrowed from it the acanthus leaf, adapted with their supreme taste to architectural decoration. The Romans is servile copyists denatured it by a purely academical application. The Romanesque workmen, copyists of Gallo-Roman ruins, perhaps inspired by a more delicate feeling, analyzing unexplained fragments, were doubtless induced to compare the ornaments, that they reproduced, whose conventional forms did not please their reasoning minds, to t the natural flora of the country. And it was not necessary to seek far to find utilizable ornamental types. Thus Gaulish art commenced to employ the natural flora in architectural ornamentation, and that later the lay sculptors by comparative reasoning, no longer taking plant types alone as a motive of inspiration, composed a decorative flora, imitated but not copied from nature, yet conceived according to the principles of plants, and placed at the scale of monumental decoration. The same principles and the same evolution are found in ornamental painting.

That brings us to speak of esthetics.

According to Viollet-le-Duc, the beautiful is unique, but varies according to the time and the races; it has no invariable type, and liberty is necessary for its origin and expansion. T "The beautiful is born and developed in the soul of the artist, and must be expressed according to the movements of that soul accustomed to conceive the beautiful, the truth."

Then truth is the fundamental principle of the beautiful.

The surroundings, manners, religion, instruction,and particularly the imagination of the artist impressed by these different causes of inspiration give to artistic creations a different typical character, while respecting the eternal and fundamental principle.

For example, thus has French (pointed) statuary produced examples of supreme beauty comparable to Greek statuary, although resulting from an entirely different inspiration and a composition without an analogy.

That being admitted, art forms vary with the intellectual evolution of the peoples, of the artists that guide or follow it:- hieratism, idealism, naturalism, transfiguration, imitation; such are the general phases in which the arts find expression

more or less approaching the idea always foreseen and never tangible.

The esthetically beautiful, a creation inspired by nature, generated by study and purified by reason, to which taste gives the definite form impressed by the imagination and imitation, but rendered typical by a respectfal application of natural principles.

Then between the idealism and naturalism must be found the artistic forms of the beautiful. Such is the doctrine of Viollet-le-Duc and that of the pointed school. By respecting this pointed art reached its climax. By pushing to excess the principle of imitation, it attained an ornamental decadence.

Likewise by exaggerating the application of the art of drawing, by abusing that application to reach the extreme limit of structural lightness, combining with an extreme science the principles of equilibrium and of elasticity, it falls into dryness a and meagreness.

It could not be otherwise according to the natural law of e evolution, which imposes on the creations of man, like those of nature, a constant advance, a beginning, a climax and an end.

These general principles are applicable to all the arts, but are complicated by geometry, a new and predominant science in architecture.

But there again the application of natural principles serves as a starting point and an esthetic base, so to speak, for geometry is the universal generating principle in nature, and art being only an emanation from nature, a second hand creation must be inspired by the same principle.

Then architecture, art and science, seek the ideal by observation based on science and having reason and taste as guides.

The object of the architectural work is a human purpose, a habitation, a place of assembly, worship or other, whatever the times, circumstances or means, the conception will be impressed by unity. It will have as a resultant expression of the combination of the differen elements composing it, the object, the need, and in brief the purpose.

The surroundings and the customs will influence it; climate will modify the forms and also the customs; but while conforming to the purpose, the principles will permit variety in the forms, which will respond to the utilitarian or ideal require-

requirements of the composition.

We reach the practice here without losing sight of the theory, and at each instant we shall find the superior guide, to which Viollet-le-Duc submits all questions; this guide being reason, reasoning and rationalism.

Inspiration, imagination, idealism, feeling and taste are w worthless in the matter of art unless guided by observation, study, science and reason.

After establishing this, the author with his superior insight defines the principles of architectural composition; plan, elevation, aerial outline, solids and voids, light and shadow, v verticality and horizontality, height and width, all sides of the question are treated with the same intelligence, the same breadth of view, the same eclecticism.

An example will demonstrate this. Let us take for that example, a principle much abused in modern times, a principle found in nature, that antiquit and the middle ages have accepted and utilized, but that they have adopted as an absolute formula, applicable without examination:-- symmetry.

Classic or pseudo-classic art made of symmetry a law, to which must submit details of distribution, composition and even decoration, and whose supreme expression is the pendant, identical and parallel repetition. In doing this, pseudo-classic art, based on a pretended knowledge of antique art, disdained the variety and picturesqueness of the middle ages and Renaissance, as works of decadence and of bad taste.

Now the pseudo-classicists were badly instructed and their science lacked observation.

What the Greeks as refined artists sought and found, was not symmetry but eurythmy, the balancing of effects. This is not a rigorous law producing the formula, but is the application of a thoughtful observation of the effects of optics and of perspective for presenting to the eyes a satisfactory appearance.

Reason utilizes science, and taste modifies the application of principles. And if the Greeks reinforced the altars of their temples, erected horizontal lines that optics made inclined, a and modified the intercolumniations to obtain certain perspective effects; if they violated the law of symmetry, this was by subtle reasoning and by a superior harmony of the effects, because symmetry was not a rule for them, but a means of obtaining

satisfactory effects.

In the matter of art, taste enlightened by science, study and reason, is the great regulator. In epochs when art was grandly cultivated, men have sought principles, have invented procedures, and have attempted to establish formulas. Art reduced to formulas is a trade and is no longer art.

What is necessary in art is method, system, the result of observation, utilizing procedures and formulas, but not subject to them. Method is useful as an ally of inspiration, formulas and procedures are helps for the executor, but are useless or hampering for the creator.

The Dictionnaire raisonee, as we have said already, has passed much outside the limits fixed by its title. The preceding rapid review has for its object to recall briefly the ideas of the author, the spirit of the work, and to justify the labor of the analytical and synthetic Table of Contents.

In fact if each word of the Dictionnaire fully treats the subject, that it entitles, and further develops its relations to other subjects treated in the work, the developments are necessarily limited by the object treated under that word. Viollet-le-Duc has made an excellent work in the form given to it by him, especially excellent from the point of view of daily practice. But this form does not easily permit the appreciation of the capital importance of the work, and taking from it the general instructions contained in it. If composed otherwise, in a form not analytic but synthetic, perhaps from the point of view of the general study of the arts and of architecture, it would be more useful to the readers.

But Viollet-le-Duc alone could have realized this recasting, or at least could have given a perfect synthetic analysis of his work. We have attempted to make this analysis in the following Table of Contents.

There are found distributed through the nine volumes of the Dictionnaire:--

- Archaeology;
- Architecture, comparative;
- Esthetics;
- History of the arts, and general history in its relations to architecture;
- Theory and practice of general construction;

Architectural composition, general history of French art from its origin, the provincial schools, the arts of the middle ages; sketches of the art of the Renaissance, derived from the pointed art;

Sculpture (ornament, statuary), painting, polychromy, glass painting, mosaic and the other decorative arts, etc. etc.

But to study a single one of those principal subjects, their ramifications, the motives and examples given by the author, it would be necessary to turn over all the volumes, and still one would find with difficulty the desired passages. We have experienced those difficulties, and we have attempted to eliminate them.

The Dictionnaire raisonne is a museum, whose study would be long and difficult by the lack of an analytical catalogue.

We have undertaken this labor of patience, and we respectfully dedicate it tc the memory of the glorious chief of the French school of architecture, a superior artist, one whose pa patriotic and learned labors have brought to light the most permanent evidences of the artistic genius of the French.

Henri Sabine.

A.

Millet; I, 413; II, 251, 430, 434; IV, 421; VII, 230, 233; VIII, 56.

Percier; II, 40, 262; V, 14; IX, 448.

Perrault; V, 219; VIII, 512.

Philibert de l'Orme; III, 53; I, 113, 326; V, 309; VII, 121; VIII, 500; IX, 56, 342 etc.

His opinion of amateur-connoisseirs; IV, 252.

Primaticcio; III, 188

Questel; IV, 509.

Rame; II, 260, 267; III, 220.

Revoil; VIII, 178.

Ruprich-Robert; III, 437; IV, 288; V, 361; VIII, 68; IX, 301.

Verdier; IV, 223.

Vitruvius; II, 199; V, 144, 210, 219; VII, 536; VIII, 511, 512 etc., with notes; IX, 69, 551.

Willis (English); IX, 525.

See Ingenieurs militaires, Ingenieurs civils, Mairest de l(oeuvre.

ARCHITECTURE. Architecture.

Names of Articles.

1. History by epochs. (Various epochs and peoples).
2. Egyptian.
3. Greek.
4. Roman.
5. Byzantine.
6. French (primitive, romanesque, Gothic, Renaissance), Transition.
7. Military.
8. Religious.
9. Civil.
10. Comparative.
11. Modern.
12. Esthetics.
13. Theory and Practice.
14. Composition.
15. Motives and Details.
16. Decoration.
17. Decorative ornament.
18. Sculpture.

Construction ogivale, Contrefort, Corniche, Couverture; Dais, Doubleau; Fenetre, Formeret; Gable, Gargouille, Griffe; Irregularities; Jube; lancette, Labyrinthe, Lierne; Niche; Pendentif, Penetration, Pignon, Pilastre, Pilier, Pinacle, Placage, Plate-bande, Porte, Portes d'eglises; Redent, Retraite, Rosace, Rose; Serrurerie, Sommier, Stalle; Tombeaux, Transsept, T Trefle, Treillage; Voutes (D and B), Voutains. Also, architecture religieuse.

Esthetics.

See Canon; Echelle; Idees; Liberte, Logique; Proportions; Realism, Realite; Symetrie; Triangle; Variete.

Theory.

See Arc ogive; Composition; Decoration; L Logique; Nombres; Ogive, Ordonnance; Pinacle; Proportions; Raison, Rationalisme; Trace, Triangles; Voutes ogivales.

Practice.

See Details; Vortiers; Raccords, Ravalement; Trait, Triangles; Voutes ogivales.

IX Renaissance. History and examples.

I, 46; II, 251, 259, 339; III, 217, 175; IV, 281, 304; VI, 182, 184, 190; IX, 307.

Religious; I, 240.

Mixture of pointed and of Roman; I, 240, 328; III, 275. See Ordres.

Inferiority; IX, 515 etc.

See Architecture moderne (XVII century); Construction (M); Liberte;(archit.); Nombres; Renaissance du XVI siecle, Romanisation.

Motives and details.

See Balustrades; Chateaux de plaisance, Combles, Construction, Corniche, Couverture; Escalier; Habitations, Hotel; Liberte; Meneau; Menuiserie; Niche; Palais, Pinacle, Porte, Portique; Renaissance;

Also see Vitrail.

III. Renaissance.

See Architecture francaise; Italiens; Jesuites; Ornement (5); Renaissance of XVI century, Romains, R Romanisation; Sculpteurs; Sculpture francaise, Statuaire (II). Vitrail.

IV. Moderne.

See Academie, Architecture moderne, Art moderne; Decoration (1); Ecole moderne; Fonte d'ornement; Individuailisme; Musees; Ornement (moderne), Ouvriers moderne; Peintres decorateurs; Peinture architecturale (generalities), Plomberie d'art, Poncif; Sculpture francaise, statuaire francaise, Sculpteurs, Statuaire (II); Verriers, Vitrail (1).

ART, GERMAN. Art Allemand.

See Architecture (history by epochs); Statuaire allemande.

ART, GOTHIC. Art ogivale.

History.

Origin; VIII, 499; IX, 246. See Suger (Abbes).

Principles; VIII, 275, 489; I, 149. See Triangle.

Expansion; VIII, 490; I, 149.

Original and creative, VIII, 232 etc., 235, 273.

Came from lay guilds; VIII, 232, 499.

Traditions serving for instruction; VIII, 233 etc.

See Pantheisme.

Superiorite, VIII, 234, 499.

Reaction and renovation(Esprit), VIII, 206, 233, etc.

National art; VIII, 234; IX, 543.

Inspiration, ideal, reality; VIII, 234.

Traditions and Gaulish spirit; VIII, 217 etc.

Antiroman reaction; VIII, 207.

Democratic and popularising; VIII, 251 etc.

Influence (Byzantine).

See Architecture byzantine; Syrie.

See Architecture ogivale, Art chretien, Arc-Ogive, Architecture militaire (moyen age), Architecture religieuse, Architecture civile; Canon; Dessin; Ecoles laiques, Ecoles d'art (Cluny), Ecoles provinciales (Ecole francaise), Encyc-

See Architecture romaine; Peinture architecturale (3); Pompeii; Romains; Sculpture antique; Verres, Vitrail.

ART, SAXON. Art Saxon.
History; VIII, 180, 187; VII, 60.
See Saxons.

ART STANDARD. Etalon d'Art.
Esthetics; II, 522.

ART AND THEOLOGY. Theologie et Art.
History; XIII century; I, 153.

ART, VENETIAN. Art Venetien.
History; I, 135 etc.
See Polychromie; Venetiens, Verres.

ARTS, ANCIENT AND MODERN COMPARED. Arts antiques et modernes compares.
History, criticism; I, v; IV, 8; VIII, 500 etc.

ARTS, DECORATIVE. Arts decoratifs.
History, practice.
See Application; Bois ornees; Decoration (III); Email; Faience, Fixe; fonte, Fonte d'Ornament; Gaufrure; Imbrication, Incrustation, Imagerie; Marqueterie, Metal (II), Mosaique; Orfevrerie, Ornement, Ornements divers; Pate, Peinture, Polychrome, Placage, Plomberie d'art; Repousse; Sculpture, Statuaire artistique, Stuc; Terre-cuite, Toiles peintes; Verre, Verres colores, Vitrail.

ARTS, LIBERAL. Arts liberaux.
Symbolism.
History, figures; II, 1 etc.

ARTS AND SCIENCES, VARIOUS. Sciences et arts divers.
History, applications.
See Acoustique, Arabes, Arithmetique, Atmosphere; Byzance; Croisades; Egypte; Geometrie; Hygiene; Linguistique; Instruction; Mecanique, Metaphysique, Musique; Peinture, Philosophie, Photographie; Sculpture, Systeme metrique; Terre (geologie), Theologie.
See Arts decoratifs.

ARTS, VARIOUS FOREIGN. Arts etrangers divers.
History.

Dallage; Ecoles provinciales (Bourgogne, Normandie); Fenetre, Ferronnerie; Maconnerie; Marbres, Menuiserie; Mitoyennete, Moines; Pavage, Plomberie, Planchers; Quincaillerie; Serrurierie;.

Also, Ancre, Appareil; Arc; Assemblage; Chainage, Chalet; Chevre, Cintrage, Conduite, Corbeau; Doubleau. Encorbeillement, Engin, Echafaud, Eperon; Fenetre, Fermeture; Maisons au moyen age; Maisons des champs, Materiaux, Metaux; Pratique; Theoree e p pratique, Technologie et pratique, Traditions; Vitrification, Voutains, Vitrage.

III. Epochs and Styles.

A. Greek; II, 397; IV, 2, 227, 245; V, 208; VI, 41, 178, 421. See Appareil.

B. Etruscan. See Etrusques.

C. Roman; I, 45, 83, 87; II; 217, 249, 383, 397; III, 252; IV, 2, 10, 13, 54, 59, 219, 245, 258, 307; V, 37, 209, 210, 524; VI, 41, 178, 401, 422; VII, 121, 151, 315; IX, 2. See Maconnerie.

Economical in principle; IX, 465, 477.

System of execution; I, 142; IV, 351; V, 104.

See Appareil, Arc de decharge; Carrelage, Charpente, Carrieres; Ferronnerie; Maconneria; Pavage; Tuile; Voutes (A).

D. Byzantine; IX, 178. See Voutes (B).

E. Celtic; VI, 293. See Menhir.

F. Gaulish; VI, 256; VII, 37; IX, 347.

See Fortifications.

Gallo-Roman; II, 250, 397; IV, 208; VII, 475; IX, 2, 347. See Ferronnerie.

G. Merovingian; II, 213, 250, 397; III, 2; IV, 3,208.

See Chateaux forts.

H. Carlovingian; II, 213, 250, 397; IV, 3; VIII, 477; IX, 347. See Fortifications.

I. Monastic; I, 130; IV, 10; VII, 122.

See Ferronnerie.

K. Romanesque; I, 45, 83, 177 etc., 492; III, 6 etc., 494; IV, 6, 13, 41, 220, 307, 349 etc.; V, 37, 524; VII, 152; IX, 272 etc., 348, 436.

See Carrieres, Charpente, Construction (general-

4. French history.

5. Mediaeval history.

6. Historical miscellanies. See Biographie.

HISTORY OF ART. Histoire (Art).

See Ecoles d'art au moyen age.

Ecole lombarde.

Ecoles de Paris (moyen age).

Ecoles provinciales.

Ecole moderne de Paris.

Also. Abbayes, Abbes, Archaeologie, Architectes, Architecture; Art, Arts decoratifs, Arts etrangers; Cathedrales, Commerce, Critique; Destructions; Eveques; Hieratisme; Incendies, Individualisme, Ingenieurs; Peinture; Race latine, Reforme, Romains (influence); Saxons, Sciences et arts divers, Sculpteurs, Style d'epoque.

HISTORY, FOREIGN. Histoire etrangere.

Notes and data.

See Allemagne, Angleterre, Anglo-Normands, Arabes, Aryas, Asie; Barbares, Byzance, Byzantin (empire); Celtes, Chinois; Egypte; Germains, Grecs; Inde, Italiens; Juifs; lieux saintes, Lombards; Normands; Orient; Palestine, Persans; Romains; Saxons, Semites, Syrie; Venitiens, Visigoths.

Also Arts etrangers.

HISTORY OF FRANCE. Histoire de France.

See Abbayes, Albigeois; Anglais, Archives, Armees, Art militaire, Academies, Artillerie.; Baillis, Barbares, Bourgeois, Bourguignons, Brigands; Cathedrales, Centralisation; Celtes, Chevalerie, Clerge, Clocher, Communes, Concile, Conclave, Confreries, Corporations, Croisades, Croises; Ecoles de Paris, Enquete, Espagnols, Etablissements d'utilite publique, Eveques; Feodalite, France, Francais, Francs; Gallo-Romains, Gaule, Gaulois, Germains, Guerres; Iconoclastes, Italiens; Jacquerie, Jeanne d'Arc, Juifs; Lepre; Municipalites; Noblesse, Normands; Orleans (ducs); Papes, Paris, Parlement, Ports, Provinces; Reforme de XVI siecle, Renaissance (romane, ogivale), Renaissance du XVI siecle, Rois, Royaute; Sieges; Templiers, Tiers etat; Venitiens,

2. Architecture, Greek.
,, Roman.
,, Byzantine.
,, Monastic.
,, Romanesque.
,, Gothic.
,, Renaissance.
,, Civil.
,, Military.
,, Comparative.
,, Modern.
3. Carpentry.
4. Decoration.
5. Ironwork, Hardware.
6. Joinery.

See Moulures; Ornement; Polychromie; Profils; Soulpture; Statuaire.

Also, Arts decoratifs; Brique; Combles; Habitations; J Jardins;

Also, Accoudoir, Amortissement, Allege, Angle decore, Anse de panier, Antefixe, Appentis, Appui, Aqueduc,

Also, Arcs (divers), Arcade, Arcature, Architrave, Axe, Archivolte; Bague, Paie, Bahat, Balcon, Balustres, Balustrades, Bandeau, Barre, Base. Cadran, Caisson, Cave, Chapiteau, Cheneau; Clefs pendantes, Colone, Conduite, Corbeau, Corniche, Couronnement, Credence, Cul de lampe, Cuvette; Dais, Dome, Doubleau, Dormant; Encorbellement, Enduit, Eferon, Entrevous, Entresol, Escalier, Etresillon; Fenetre. Frise, Fronton, Fut; Gable, Galerie, Galetas, Gironette, Goutterot, Griffe, Grille, Grillage, Guichet. Horloge; Imposte; Lanterne, Lavabo, Lavoir, Lucarne, Lunette, Linteau; Mansarde, Main-courante, Meneau, Mur d'appui; Naissance, Niche; Oculus, Oeil; Pendentif, Piedroit, Perron, Penetration, Pignon, Pilastre, Pile, Pilier, Pilette, Pinacle, Plafond Planchers, Plate-bande, Poincon, Porche, Porte, Portique, Portiere; Raccords, Revetements, Retraite, Rosace, Rotonde; Sarcophage, Silo, Socle, Sommier, Soubassement; Tailloir, Tombeaux, Tas de charge,

APPENDIX.

ANALYTICAL TABLE OF
Names of Places cited in the Dictionnaire
By Departments in France
By foreign Countries.

The monuments in each city are detailed in the general Table of Volume X.

FRANCE.

II. FOREIGN COUNTRIES.

End of Analytical Index.